THE IRON AGE

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Adaptability in a Jobbing Steel Foundry

Illustrated at the Prime Steel Company, Milwaukee, Where Quantity Production, Shrinkage Difficulties, and Exceptional Accuracy Are Involved

In the ordinary sense the jobbing foundry is not equipped to handle work for which only highly competitive quantity prices prevail, and out of which a profit must be made by methods of quantity production. But the Prime Steel Company, Milwaukee, Wis., has adapted itself to such a problem in the casting of 1000 steel car bolsters making use of simple expedients that allow handling the work at a reasonable cost. The bolsters are of standard length and are cast in a two-part mold from cope and drag brass-capped patterns mounted on match boards as illustrated in Fig. 1. The bolsters are of such size that the flasks and molds are too heavy to be manipulated by hand, while turning the molds over with the crane is much too slow.

Fig. 1—Method of Making Up the Mold for a Car Bolster Showing the Device for Rolling Flasks Over on Two Parallel Rails

As shown in the illustration, two heavy parallel stringers surmounted by lengths of rail were laid on the floor with a span suitable to the length of the flasks. The flasks are cast with trunnions projecting from the ends so that when the flask is set down on the rails the mold may be rolled over as much as desired in process of completion, made ready for setting over on the pouring floor and closed quickly and with little effort. A couple of gaggers wedged under the trunnions are sufficient to keep the flask from rolling when the molder is working on the mold. The molds are rammed on a jolt rammer.

For the drawing of the patterns a metal vibrator shoe is fastened to the under side of the match board. An air line brought to this point of the floor permits the use of a vibrator which fits into the shoe and effects an easy drawing of this long pattern by hand. The illustration shows the drag pattern and flask in the background. The casting is poured from one end and Fig. 2 shows a floor of molds being closed up for pouring. On the two open molds the body cores are conspicuous.

The equipment in the cleaning room for finishing up the castings includes a battery of Ransom portable sulky grinders supplemented by pneumatic chipping hammers.

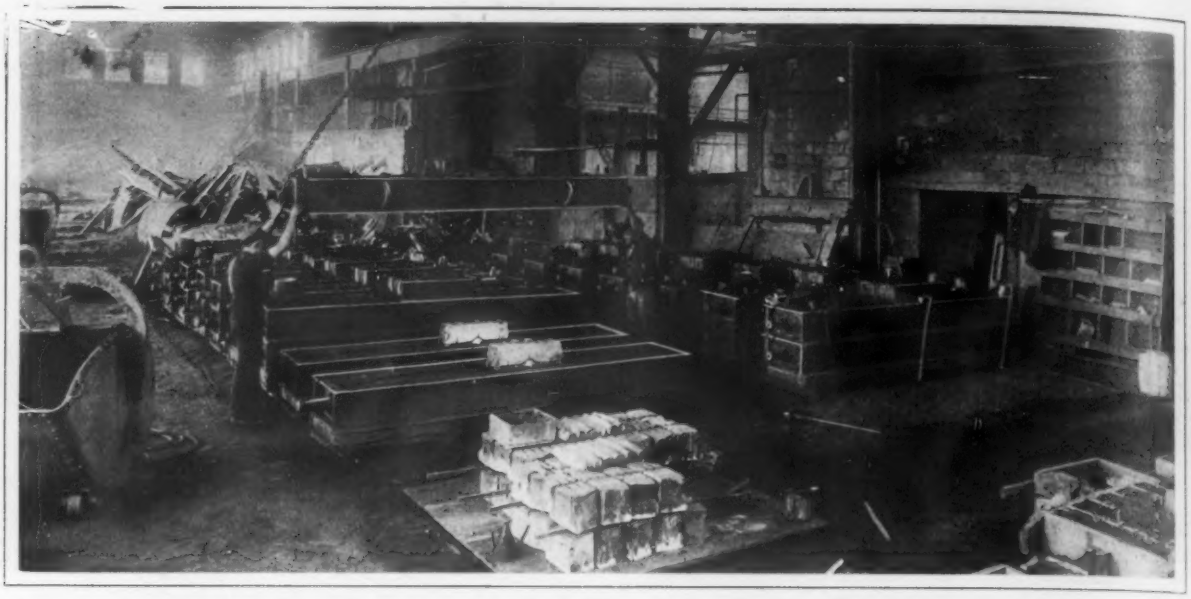


Fig. 2—View in Foundry of Prime Steel Company Showing a Floor of Bolster Molds Ready for Pouring. The foreground shows the mold open, with the cores set and cope ready for placing.

Another interesting job now going through this foundry is the casting of the converter tops illustrated in Fig. 3. The difficulties to be overcome arise out of the thin metal section of the casting, or in other words, its size as compared with its weight. These tops have a diameter of 13 ft. across the bottom flange, 6 ft. across the top opening, are 9 ft. 8 in. from top to bottom on the high side, but weigh only 15,000 lb., the shells having a thickness of only 1⅛ in. The metal for the casting was treated with ferrotitanium, the alloy being added in the ladle, and much of the success in securing castings free from cracks and of uniform thickness is attributed to that treatment.

A skeleton pattern is used and the cast is made in a three-part mold, the drag portion being built in a pit and kept 6 in. below the joint of the concrete lining of the pit because of the excessive pressure. The cheek which is built in a 14-ft. flask and the cope are shown in the general view, Fig. 4. The piece is poured through one central gate at the top with eight runners.

Another job, interesting because of the precautions taken to insure great accuracy and exact duplication, is illustrated in Fig. 5, in which the pieces are shown assembled and being machined. The piece is a runner blade, eight of which when assembled form a propeller for the pumps now building at the plant of the Nordberg Mfg. Company for the city of New Orleans. The blades when fitted together constitute a perfect screw and it is accordingly necessary that each blade be cast at just the right angle and that the weight of all of them be exactly alike. For this reason it was decided not to use a pattern but to make up the job in cores. These cores and the boxes for them are

Fig. 3—Views from Top and Flange Sides of Two Steel Casting Converter Tops at the Prime Steel Company. Metal averages about 1⅛ in. in thickness; castings weigh only 15,000 lb.

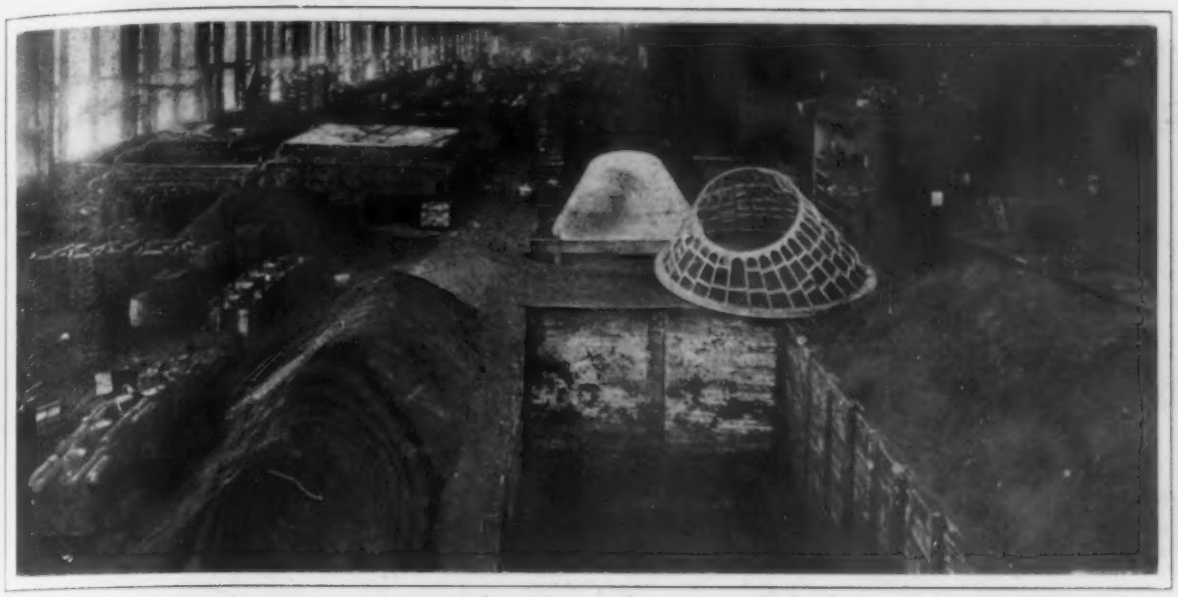


Fig. 4—Open-Hearth Steel Foundry Showing in the Foreground the Pattern, Drag Part of the Mold and at the Left the Cheek and Cope for Casting a 13-Ft. Converter Top. The concrete lined molding pit is also shown.

shown in Fig. 6. There are three parts, as shown, one mounted on the plates and the other two bolted together and suspended from the frame.

The Prime Steel Company has recently added a number of improvements at its Dutcher works. The main span of the foundry, 70 ft. in width, has been extended to an over-all length of 476 ft. and at the same end a new system of storage bins has been installed. These bins are placed so that the materials to be stored may be loaded into them by gravity from the elevated tracks of the railroad which passes the plant. The bins are of frame construction and the entry ways from the foundry for access to the stored materials present an interesting arrangement. This is shown in Fig. 7. The entry is vestibuled and the inner door is closed with removable boards, a small opening being left at the bottom. The bin may thus be filled to capacity, while at the same time material may be shoveled out from the doorway with convenience and without waste. The vestibule prevents the material from rolling or sliding out into the main passageway, where a track is laid for a transfer car, as illustrated. The storage system will also include a central elevated hopper for sand, which will be brought by conveyor and continuous elevator from the bin into which it is discharged directly from the car. From the elevated hopper the sand will be drawn as required.

The mold-drying oven, of which a view is shown in Fig. 8, has just been completed. It is 20 x 24 ft., with a hight of 12 ft. from the top of the oven cars to the roof. It is bottom fired from the outside of the building, and is equipped with a pyrometer for the regulation of temperature. The oven door is a rigid steel plate shield and is raised and lowered

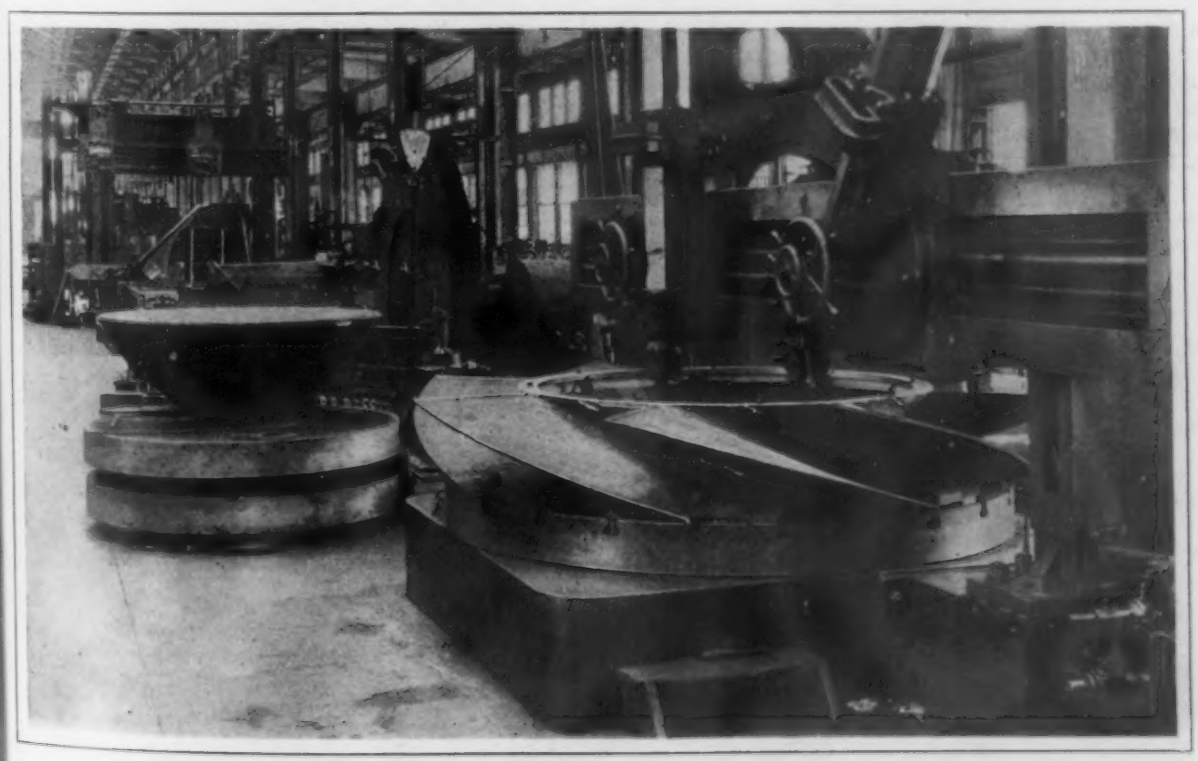


Fig. 5—View of the Propeller, the Mold for Which Is Illustrated in Fig. 6. The propeller hub is shown at the left. This is a propeller for one of the New Orleans drainage pumps.

Fig. 6—An Interesting Molding Job Made up in Cores in Three Parts. The suspended portion of the mold consists of two parts and is reversed as shown from the position in which it fits over the third section on the floor in order to show the joint and inserted chill. In the foreground is the core box for one of the suspended portions and in the background the core box for the other.

pneumatically by means of an 8-in. Curtis cylinder.

The molding facilities of the foundry have also been enhanced by the building of the concrete lined casting pit shown in the foreground of Fig. 4. This is 14 ft. wide, 36 ft. long and 8 ft. deep, with 18-in. concrete side walls, 24-in. ends and bottom. It is equipped not only with tie irons on both sides and at the ends, but there are cast in the reinforced concrete bottom steel eyes spaced at regular intervals for the attachment of turn buckles or other rigging for holding down heavy cores, or for binding down the copes, when the pit is partitioned off to accommodate more than one mold. This dividing of the pit into smaller pits, 12 x 14 ft. or 7 x 36 ft., is facilitated by the recesses placed in the walls at intervals of 3 ft.

Special attention has also been placed upon the facilities for finishing up the castings after they come out of the sand. There is a cleaning room at each end of the foundry, one for the light work and the other for the heavy castings. This arrangement prevents any clogging of work arising out of the confusion of small and large pieces. Both cleaning rooms are equipped with sand blast, air hammers and both electric and acetylene welding apparatus. For correcting distortions in the castings developed in the process of cooling, a 500-ton hydraulic press has recently been installed. The

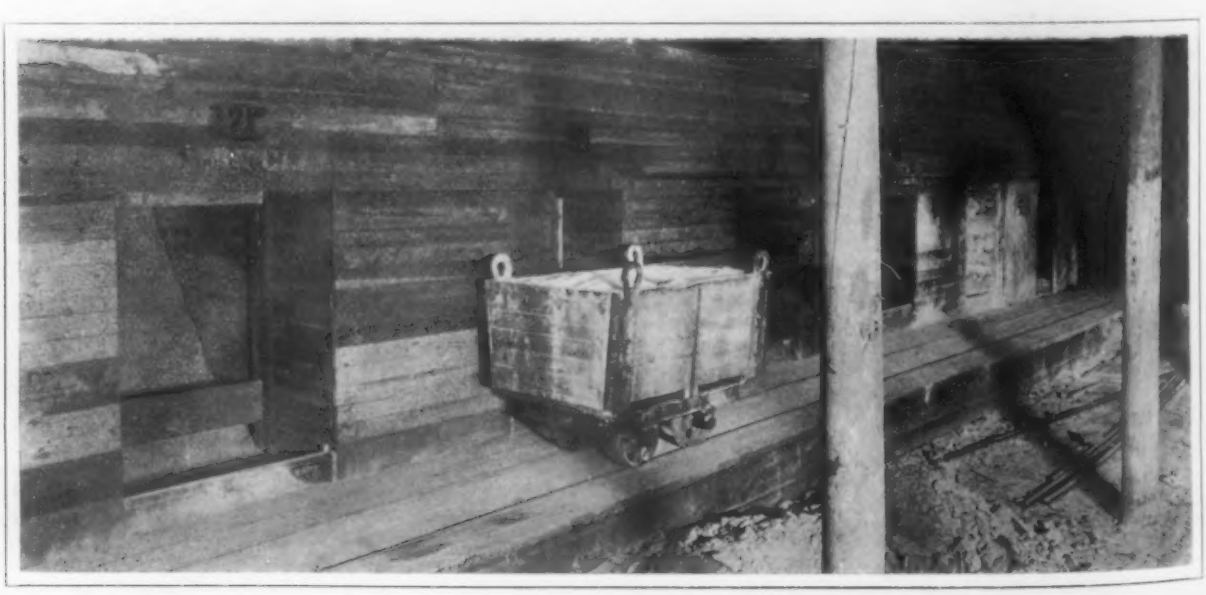


Fig. 7—View of Some of the Storage Bins of the Prime Steel Company.

company also operates a crucible department and Fig. 9 illustrates some of the heavier and more difficult classes of work handled in that department.

SELLING PRICE OF CASTINGS*

An Investigation Into the Practices of Estimating Foundry Costs and Profits

BY A. O. BACKERT

To ascertain the methods pursued by foundrymen in estimating the selling price of castings, an investigation was conducted, 1000 letters having been mailed to all of the members of the American Foundrymen's Association and leading jobbing foundries of the United States. A series of eleven questions was asked and a total of 109 replies was received. It frequently has been stated that the number of foundrymen who make careful estimates on work is not large, yet the bulk of the replies received indicates that an earnest effort is being made to quote intelligently on new work. It cannot be denied that the practice of guessing at the selling price of castings is still too prevalent for comfort and it is hoped that some standard system of estimating will be evolved which can be followed by foundrymen generally. The questions submitted follow:

1.—How do you determine the selling price of your castings?

2.—Do you employ an estimator to compute the selling price?

3.—Do you follow any special rule or formula in preparing an estimate?

4.—What ratio does your overhead expense bear to your labor cost?

5.—What do you include in your overhead expense?

6.—In making an estimate, what allowance do you figure for contingencies such as haulage, special rigging, pattern repairs, rejections, etc.?

7.—What percentage of profit do you estimate on each job?

8.—Does the estimated percentage of profit vary on heavy and light work?

9.—How do you estimate labor cost on a job and what do you include in this estimated cost?

10.—How do you estimate the cost of molten metal in the ladle?

11.—Do you base your estimates on data previously obtained from your cost system?

*From a paper presented to the American Foundrymen's Association, Chicago, September 9. The author is secretary of the association.

It was surprising to note that practically one-half of the foundries employ estimators and operate estimating departments, while a number delegate this work to one of the plant executives. Only one empirical formula was reported for estimating the selling price of new work. Many foundrymen are averse to accepting formulas at their value, believing them to be the obscure symbols of the abstruse sciences. However, in several well-managed shops a similarity of formulas has been found, which would indicate that the adoption of a universal system would not involve many difficulties. This formula used by several foundrymen, follows:

$$W + L + 1\tfrac{1}{2}\ L + C + P = \text{the selling price}$$

W represents the weight of the casting and this multiplied by the cost of the metal in the ladle gives the cost of the metal in the casting; L represents all labor, including molding, coremaking, melting, shipping, etc., and $1\frac{1}{2}\ L$ represents the overhead charges; C represents contingencies and includes casting losses, haulage, special rigging, pattern repairs, etc., and P represents the profit.

The ratio of overhead expenses to direct labor cost was found to vary considerably and as high as 3:1 was reported. Numerous interesting replies also were received in answer to the question regarding percentage of profit estimated and in most cases competition governed this entirely. With few exceptions, all the foundrymen answering the questions submitted reported that they based their estimates on data previously obtained from their cost system. This would indicate that an earnest effort is being made to arrive at accurate costs, but evidently the systems in use are inadequate or they are improperly applied.

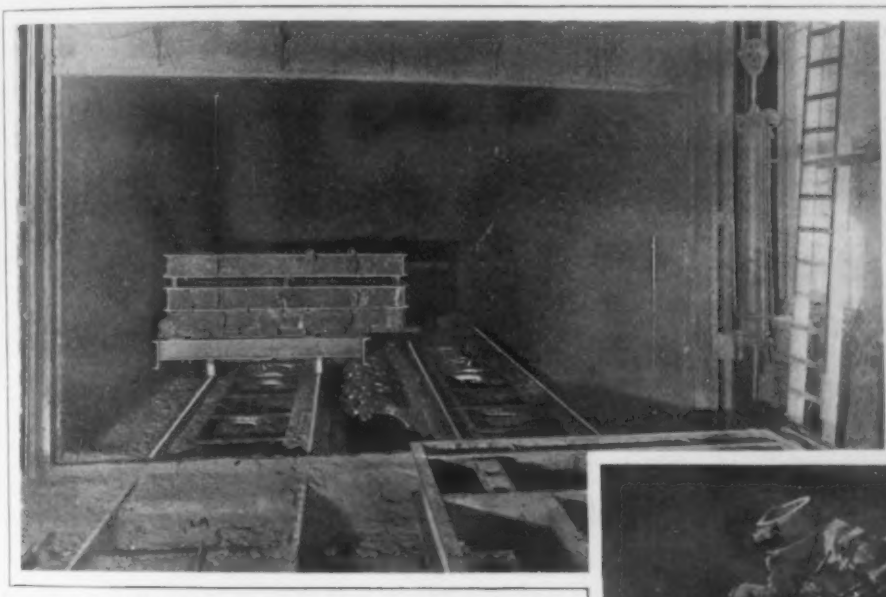


Fig. 8—New Mold Drying Oven, 20 x 24 x 12 ft., Which Is a Part of the Improvements Recently Completed by the Prime Steel Company.

Fig. 9—Two Interesting Motor Truck Jobs for Which Castings Were Made in the Crucible Department of the Prime Steel Company. The axle housing weighed 1375 lb.

The Toledo Pipe Threading Machine Company, Toledo, Ohio, has moved into its new plant at 1421 Summit avenue. The building is an up-to-date fireproof structure, 110 x 160 ft. With its new quarters the company will be able to increase largely its output.

DECARBURIZATION OF STEEL*

Effect of Various Salt Baths Used for Heating Before Hardening

BY A. M. PORTEVIN

The use of baths of molten alkaline salts for heating steel parts prior to hardening is becoming more and more widespread in industry. They allow, indeed, of the much more rapid heating of small parts, and of adjusting, as accurately as possible, the temperatures of heating. Besides this, superficial oxidation is avoided, or at any rate considerably reduced. But—and in the author's opinion insufficient attention has hitherto been paid to this fact—superficial decarburization occurs, and this becomes strongly marked in cases where the heating is prolonged. The author has carried out a series of experiments with the object of investigating this decarburization, the results of some of which are here given.

Samples of a hyper-eutectic steel containing 1.46 per cent. carbon, and in the form of little cylinders 20 millimeters in diameter and 10 millimeters deep, were maintained for varying periods in molten potassium chloride at 1000 deg. C. For each period of remaining in the bath a sample was examined, after heating without quenching, under the microscope; another was heated to 750 deg. C. and quenched in water. This served for the hardness determinations. The results have been tabulated in Table 1.

It will be very clearly seen that with an increase in the length of time the sample remains in the bath there is an increasing decarburization, marked both by an increase in the depth of decarburized layer and by the lowering in the carbon percentage of the surface, which falls to 0.2 per cent. This decarburization is most noticeable after quenching, being revealed more particularly by testing with the Shore sclerometer, which is readily explained by the fact that this test applies only to a small depth, whereas the result of the Brinell test is influenced by the hardness of the subjacent layers.

Table 1.—Decarburization of Steels in a Molten Potassium Chloride Bath at 1000 deg. C.

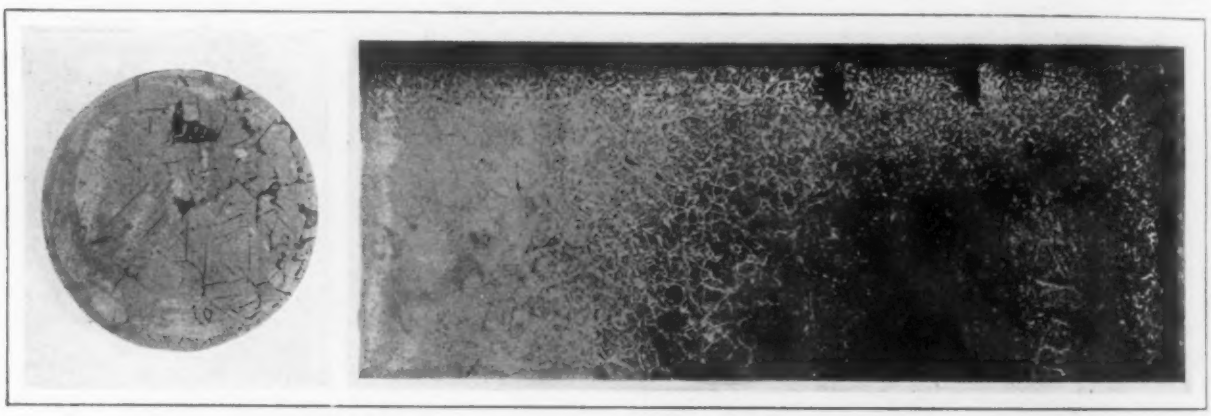
Duration of heating, hours	Thickness of the hypo-eutectic layer, millimeters	Thickness of the eutectic layer, millimeters	Percentage of carbon at surface.	Brinell test, ball 10 millimeters diameter, pressure, 3000 kg.	Shore test, average of 5 rebounds
¼	0.0	0.18	0.9	2.39	79.8
2	0.48	1.00	0.4	2.94	41.0
5	0.84	1.50	0.2	2.89	32.0

*From a paper prepared for the abandoned fall meeting of the Iron and Steel Institute.

By experimenting at 900 deg. C., instead of at 1000 deg., the decarburization is naturally less deep, but almost as great so far as the superficial lowering of the carbon percentage is concerned. It should, however, be noted in the comparisons that may be drawn from these results, that the steel employed in the experiments at 900 deg. C. contained only 0.78 per cent. carbon (Mn., 0.28 per cent.; Si., 0.37 per cent.).

Experiments were made with this same steel in the salt bath described by Brayshaw for use in his hardening furnaces. The degree of decarburization is, so far as its importance is concerned, quite comparable with that found with the pure sodium-chloride bath; in any case the influence of the small amount of ferrocyanide added with the object of counteracting the decarburization does not appear very efficacious. It seems improbable, however, that the ferrocyanide can have no action, and besides, the experiments were made over again after the addition of a larger proportion of ferrocyanide to the potassium chloride (10 per cent.).

By working at a temperature of 900 deg. C. on the same steel (0.78 per cent. carbon), and with the periods of remaining in the bath of one quarter, two and 5 hours, a decarburization is again found which is even deeper, but less intense, in the sense that the superficial carbon percentage does not fall so quickly (Table 2). Care had been taken to place in the bath, at the same time samples of carbon-free iron (Lancashire iron), which remained immersed for similar periods, and it was found that these samples had simultaneously undergone carburization. The interesting point is that the depth of this carburization increases with the duration of the heating, whereas the percentage of superficial carbon appears to remain very nearly constant. Unfortunately the phenomenon becomes complicated by the decomposition of the ferrocyanide, which is evidenced by the production of a muddy deposit at the bottom of the salt bath. The author has followed up the investigation of this phenomenon by replacing the ferrocyanide by cyanide, and it is therefore solely with mixtures of potassium chloride



The Small Photomicrograph Shows the Needles in the Ferrite in a Sample Taken at the Boundary of Carburization When the Bath Contains Potassium Cyanide. The Large Photomicrograph Illustrates a Case of Carburization Equilibrium

Table 2.—Decarburization and Carburization at 900 deg. C. in a Bath of Potassium Chloride to which 10 per cent. of Ferrocyanide Has Been Added

	Steel containing 0.78 per cent. of carbon		Lancashire iron	
Duration of heating, hours	Thickness of decarburized layer, 1/10 millimeter	Percentage of carbon at surface[1]	Thickness of decarburized layer, 1/10 millimeter	Percentage of carbon at surface[1]
¼	2.0	0.5	2.5	0.25
2	4.0	0.35	3.5	0.3
5	6.5	0.25	4.5	0.3

[1]Estimated microscopically.

and potassium cyanide that he at present concerns himself.

Mixtures of cyanide and cyanate of potassium have enabled the author to establish equilibria of carburization between the steel and the bath, and of a nature that it is possible to observe, simultaneously, in the same bath, the decarburization of hard steels and the carburization of dead-soft steels. To do this there were added to the potassium chloride increasing quantities of potassium cyanide up to a proportion of 75 per cent. of the total weight of the mixture, and there were immersed in the molten mixture at 900 deg. C. samples of hard steel (0.78 per cent. of carbon, 0.37 per cent. of silicon, and 0.28 per cent. of manganese) and of carbon-free iron which were left for varying periods. Subsequently the depths of decarburization and of carburization were ascertained under the microscope, together with the percentage of carbon superficially. Table 3 gives the principal results obtained.

Table 3.—Decarburization and Carburization in Mixtures of Chloride and Cyanides of Potassium. Steel Containing 0.78 Per Cent. of Carbon

Percentage of KCN in bath	Duration of heating, hours	Thickness of the decarburized layer, millimeter	Percentage of superficial carbon	Thickness of the carburized layer, millimeter	Percentage of superficial carbon
25	¼	0.09	0.25	0.18	0.25
	2	0.37	0.30	0.37	0.25
	5	0.75	0.25	0.62	0.30
50	¼	0.12	0.35	0.10	0.15
	2	0.37	0.20	0.37	0.20
	5	0.68	0.25	0.50	0.25
75	¼	0.06	0.25	0.12	0.25
	2	0.48	0.20	0.44	0.25
	5	0.69	0.25	0.44	0.25

It will be seen that, under the same conditions, decarburization and carburization occur simultaneously, according to the grade of steel, and if the longest period of heating (five hours) be taken into consideration, there will be found, as the average superficial percentage of carbon in the steel, for all three mixtures: in the carburized layers, 0.26 per cent.; in the decarburized layers, 0.25 per cent.

The two phenomena appear, therefore, to tend toward a common limit which would be the carbon concentration of the steel which remains in equilibrium at 900 deg. C. in the chlorocyanide bath. This limit appears, in the mixtures experimented on, to be independent of the quantity of potassium cyanide present in the bath.

Incidentally it has been noted, microscopically, that very frequently when these baths contain cyanide of potassium, and likewise when they contain ferrocyanide of potassium, there appear, in the ferrite, subjacent to the carburized layer, needles of an appearance similar to those described by Braune in his researches on the influence of nitrogen on iron and steel. The round photomicrograph gives an example taken at the boundary of carburization. Some areas of pearlite are still distinguishable on one side of the figure, but the ferrite grains are traversed by needles. These needles are present in too small a number for it to be possible to ascertain whether, within one and the same grain, there may be (which is improbable) more than, at most, four directions.

This phenomenon of carburization equilibrium can be brought out in an even more striking manner, as follows: A highly case-hardened iron is taken and a section made at right angles to the case-hardened surface. By these means there is obtained in the section a progressive decrease in the percentage of carbon, or, in other words, a complete and continuous scale of the different shades of steel. On the samples thus prepared, the preceding experiments are carried out, and there will be found, on examining under the microscope, a section perpendicular to the surface just referred to, the simultaneous decarburization of the zones rich in carbon, and the carburization of the zones low in carbon. This is brought out very clearly and very strikingly in the large photomicrograph which is given by way of a commentary on and a conclusion to this paper.

American Shipbuilding Company's Report

The American Shipbuilding Company has issued its annual report for the year ended June 30, 1914. The income account compares as follows with the preceding year:

	1913-14	1912-13
Net earnings	$712,061	$849,874
Depreciation, interest, etc.	432,757	243,400
Balance	$279,304	$606,474
Preferred dividends	276,500	553,000
Surplus	$2,804	$53,474

The general balance sheet as of June 30, 1914, compares as follows:

Assets	1913-14	1912-13
Plants and properties	$18,740,530	$18,965,312
Material on hand	530,331	611,175
Stocks and bonds	1,873,209	2,377,214
Advances to subsidiaries	351,397	.....
Uncompleted contracts	4,959	838,281
Cash	587,579	957,282
Accounts and notes receivable	1,484,925	2,325,885
Deferred charges to operations	57,744	.....
Total	$23,630,676	$26,075,149
Liabilities		
Preferred stock	$7,900,000	$7,900,000
Common stock	7,600,000	7,600,000
Accounts and notes payable	672,852	3,226,065
Accruals	68,367	.....
Funded debt	250,000	.....
Appreciation in real estate, buildings, etc.	1,137,481	.....
Reserve fund	.....	787,718
Profit and loss surplus	5,441,235	6,561,367
Total	$23,630,676	$26,075,149

In his accompanying statement to stockholders, President Edward Smith said:

"Owing to the general business depression which has prevailed for the last two years, especially in the iron and steel trade, the business on the Great Lakes for the year ended June 30, 1914, has been unsatisfactory. We believe that when the steel business revives business on the Great Lakes will also be much better, but, in view of the prevailing and continued depression, the directors have deemed it unwise to make any declaration of dividends for the fiscal year ended June 30, 1914, in excess of the 3½ per cent. already paid.

"The financial condition of the company is most satisfactory. During the past year its liabilities have been reduced over $2,000,000, thus putting it in excellent shape to await the revival of business. The condition of the property at the various plants has been maintained, and necessary but large expenditures have been made to change and enlarge the dry docks, which enlargement has been requisite owing to the increased size of the vessels constructed on the lake. During the year the company built 16 vessels with a carrying capacity of 83,100 net tons."

The St. Louis public school system has been extended, in its night division, to include unit courses for men employed in the mechanical trades, covering pattern making, foundry practice, blacksmithing, machine shop practice, cabinet making, mechanical drawing, etc. The courses will be taught in such units that the student employed during the day may combine them in any way he may desire and continue them until proficient in all the units applicable to his trade. The plan is to give thorough training, not alone in the student's special employment but in all the allied subjects.

Titanium Ores in the Blast Furnace

Important Results of the Port Henry Experiments—Concentrates Smelted Containing Over 12 Per Cent. Titanic Acid

BY EDWIN F. CONE

The successful smelting of titaniferous iron ores has taken a long step forward. This has been achieved by the experiments of the MacIntyre Iron Company at Port Henry, N. Y., on the production of pig iron from the titanium-bearing Adirondack iron ores of New York State. In *The Iron Age* for October 2 and 9, 1913, announcements were made of the plans of the MacIntyre Iron Company to lease the Northern Iron Company's blast furnace for this purpose and the scope of the experiments, and *The Iron Age* for March 12 and June 18, 1914, gave brief accounts of the progress of the work. The lease of the furnace having expired with July, the experiments have been completed and the results are available— results that are highly important and interesting. The test is probably the largest and most extensive of the kind ever undertaken.

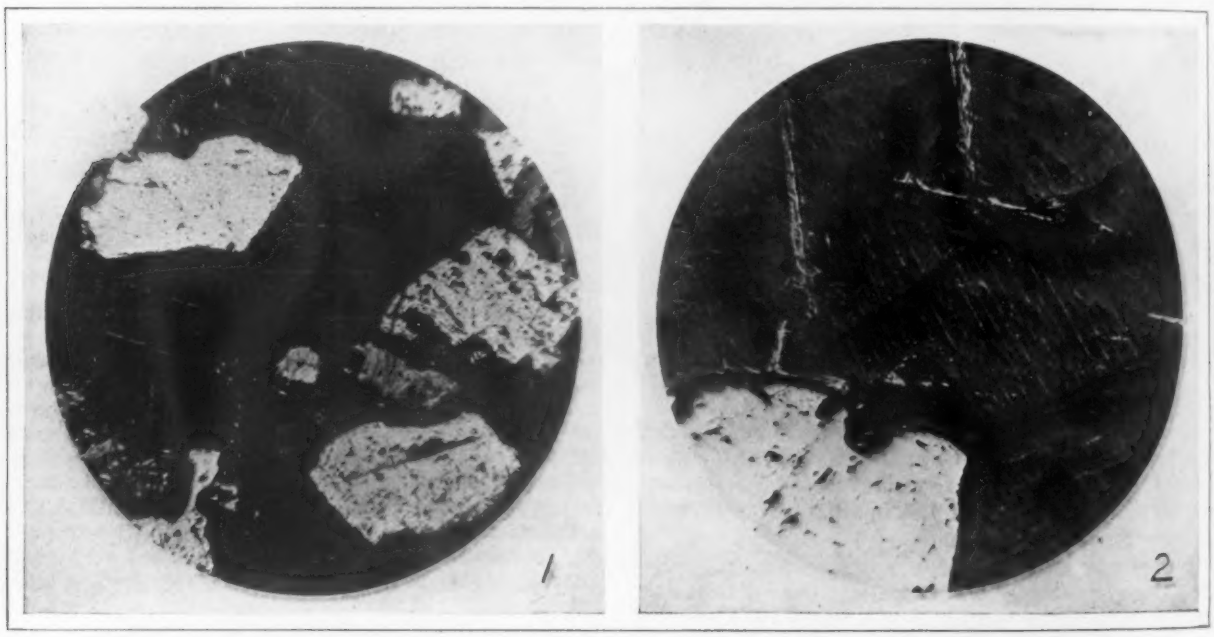
The object of the work has been to determine to what extent the vast deposits of high-grade titaniferous iron ores of the Sanford Hill district in New York State could be concentrated and successfully smelted into a marketable pig iron. Many problems have presented themselves that were unexpected and many of the pre-existing theories refuted, but the general result has been more satisfactory than anticipated.

COMPOSITION OF THE ORE

Without doubt the concentration of the original ore is one of the difficult problems entering into the success of the enterprise. To eliminate as large a percentage as possible of the titanium-bearing portion of the ore, the ilmenite, is the object aimed at. The average composition of the large deposits of this important ore is represented by the complete analysis in Table 1 of about 1000 tons of old ore, which was later concentrated by one of the Witherbee, Sherman & Co.'s concentrators and which formed the basis of the first run of the experiments:

Table 1—Analysis of Typical Sample of Sanford Hill Ore.

		Per cent.
Silica	SiO_2	5.18
Ferrous oxide	FeO	32.01
Ferric oxide	Fe_2O_3	32.24
Alumina	Al_2O_3	4.20
Titanium oxide	TiO_2	21.02
Manganese oxide	MnO	0.34
Vanadium oxide	V_2O_5	0.35
Chromium oxide	Cr_2O_3	0.16
Calcium oxide	CaO	0.42
Magnesium oxide	MgO	1.86
Alkalis	K_2O and Na_2O	0.74
Phosphoric acid	P_2O_5	0.035
Sulphur	S	0.142
Carbon dioxide	CO_2	0.50
Carbonaceous matter		0.15
Combined water		1.41
Total iron	Fe	47.47
Titanium	Ti	12.61
Manganese	Mn	0.26
Vanadium	Va	0.20
Chromium	Cr	0.112
Nickel	Ni	Trace
Phosphorus	P	0.018



Sanford Hill or Titaniferous Iron Ore Magnified 20 Diameters. The Light Grains Are Ilmenite and the Dark Ones Magnetite

Iron Mountain Ore Containing Only Traces of Titanium, Magnified 20 Diameters, Showing Light Grains of Ilmenite and Dark Ones of Magnetite

The high titanium content as well as the high quality of the ore is evident from this analysis which is said to represent fairly the great mass of the ore of the district under investigation.

The titanium in the large titaniferous deposits of New York State at Sanford Hill exists in the ore principally as the mineral ilmenite, which is non-magnetic. The more normal ores of this district, the Iron Mountain ore in particular, owned by Witherbee, Sherman & Co., contain very little ilmenite or titanium in any other form. This is the ore which has been used in the charges with the Sanford Hill ore in the experiments. An illuminating comparison of these two important ores is furnished by some of the photomicrographs, prepared by the Titanium Alloy Mfg. Company, Niagara Falls, N. Y., which illustrate this article. The relative amounts of ilmenite are shown comparatively

by the proportion of white grains in the respective microscopic photographs of the ores.

PREPARATION OF THE CONCENTRATES

The original plan of the MacIntyre Iron Company called for the concentration of the ore at the mine and for this purpose a modern magnetic concentrator was erected. This plant was only partially successful and ultimately had to be abandoned in the early stages of the undertaking owing to its inadaptability in design to the work intended. It is recognized that each brand of ore, whether titaniferous or otherwise, requires a concentrator especially modified and designed to do the most efficient work. Nevertheless, the concentrator at the Sanford Hill mine turned out a considerable amount of concentrates which were used in the charges in June and July.

Besides the concentrates made by the MacIntyre Iron Company, others were produced by some of the concentrators of Witherbee, Sherman & Co. The 1000 tons of ore, which was mined several years ago and an analysis of which has already been given, was concentrated by the No. 2 concentrator of Witherbee, Sherman & Co. with excellent results. This ore had been stored for some years at North Creek on the Delaware & Hudson Railroad. To bring it to this point it had been hauled to the end of the state road near Newcomb, N. Y., by wagons or logging locomotives. It was stored there until the snow disappeared and then shipped by auto trucks to North Creek. The distance covered was 12 miles on snow and 18 by auto truck. Its transportation from North Creek to Mineville was by rail. An analysis of the concentrates made from this ore is given in Table 2. Owing to the destruction by fire of Nos. 2 and 3 concentrators of Witherbee, Sherman & Co., the other two, Nos. 1 and 4, were used to produce concentrates enough to supply the furnace. The product produced by No. 1 concentrator is given also in the table. The new modern concentrator, No. 4, at the Barton Hill mine produced a concentrate of about 13 to 13.50 per cent. titanium oxide and 55 per cent. iron.

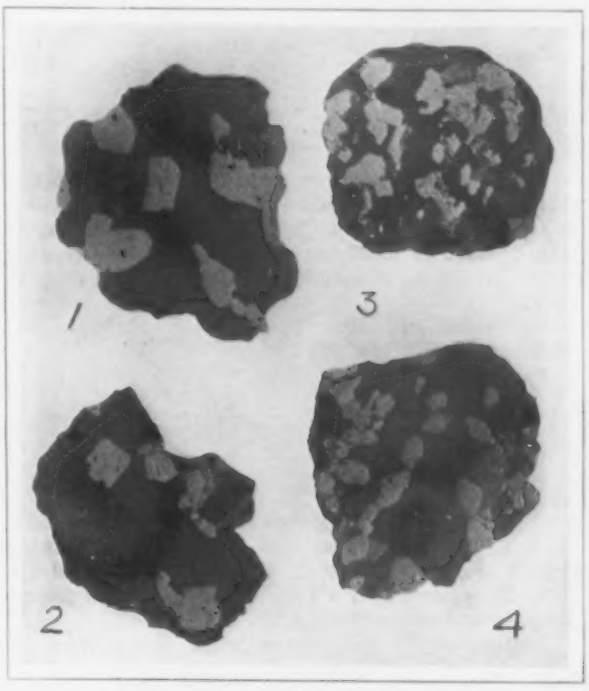
Table 2.—Concentrates of Titaniferous Iron Ore.

	Concentrator of MacIntyre Iron Co. Per cent.	No. 2 concentrator W. S. & Co. Per cent.		No. 1 concentrator W. S. & Co. Per cent.
Iron, Fe	54.11	56.47	55.95	54.82
Silica SiO_2	2.50	2.35	2.55	2.70
Phosphorus, P	Trace	0.004	0.003	0.004
Manganese, Mn	0.17	0.20	0.18	0.22
Alumina, Al_2O_3	4.60	3.68	3.98	4.98
Lime, CaO	0.45	0.45	0.12	0.15
Magnesia, MgO	1.79	0.95	1.62	1.87
Titanic Acid, TiO_2	13.78	11.83	11.80	13.98
Vanadium Oxide, V_2O_3	0.629	0.415	0.40	0.546
Nickel Oxide, NiO	0.350	0.052	0.049	0.0475
Sulphur, S	0.054	0.137	0.119	0.137
Chrom. Oxide, Cr_2O_3	0.123	Trace	0.244	0.280

From these analyses it is evident that the degree of concentration varies, depending somewhat on the concentrator used. The best product came from the No. 2 concentrator of Witherbee, Sherman & Co., where the content of titanium oxide was brought down to under 12 per cent., whereas in the other cases it was scarcely under 14 per cent. The results have demonstrated that there are many points to be learned in the designing and manipulation of a concentrator in order to produce an ore low in titanium and hence contribute more materially to the success of the smelting.

PLAN OF THE EXPERIMENTS

The plan adhered to in conducting the experiments in smelting the ores was to commence with a charge of one-sixteenth titaniferous ore. After a sufficient run on such a charge, the titanium ore was to be increased to one-eighth, then to three-sixteenths, to one-quarter and to five-sixteenths. The balance of the ore charged consisted, of course, of the regular normal ore of the district. The first charges were made on February 3, 1914, when one-sixteenth was used until February 6, or three days. Then the charge was increased to one-eighth. This



Samples of Iron Mountain Ore (1 and 2) and of Sanford Hill or Titaniferous Ore (3 and 4) Polished, Etched and Magnified Two Diameters. Light Grains Are Ilmenite and Dark Ones Are Magnetite

was continued for seven days, or from February 6 to 16. During this 10-day period, foundry iron was made. The only trouble experienced during these 10 days was an excessively fluid slag, appearing principally when one-eighth was the charge. But even then there were only a few breakouts due to this fluidity. The analysis of the foundry iron made during this period, where one-eighth was used, is given in the following average range of five casts:

Foundry Pig Iron Made When One-eighth Titanium Ore Was Charged.

Silicon Si	2.000	1.850	2.500	3.000	2.700
Sulphur S	0.027	0.035	0.021	0.021	0.015
Phosphorus P	0.632	0.609	0.620	0.642	0.650
Manganese Mn	0.440	0.480	0.500	0.410	0.320
Titanium Ti	0.494	0.500	0.595	0.569	0.599
Vanadium Vo	0.058	0.062	0.067	0.075	0.069
Gr. Carbon, G.C.	3.280	3.230	3.390	3.570	3.470
Com. Carbon C.C.	0.510	0.540	0.370	0.250	0.230
Total Carbon T.C.	3.790	3.770	3.760	3.820	3.700
Chromium Co	0.038	0.035	0.039	0.036	0.038

Analyses of the Slag Produced at the Same Time Ran About as Follows.

	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Silica, SiO_2	31.70	29.60	33.00	31.90	30.90
Alumina, Al_2O_3 & Iron Oxide, FeO	14.90	14.95	15.30	13.05	15.10
Titanium, TiO_2	3.00	4.00	4.65	3.05	2.70
Sulphur, S	1.60	2.05	1.75	1.40	2.05
Lime, Cao	40.30	....	....	....	....
Magnesia, MgO	9.21	....	....	....	....

The pig iron made on a charge of one-sixteenth titanium ore differed very little from the above, nor was there any appreciable difference in the working of the furnace. The pig iron was normal in every respect.

Operations, using titanium ore, after February 16 were abandoned owing to the failure of the concentrator at Sanford Hill mine and the delay in arranging for concentrates made at the concentrators of Witherbee, Sherman & Co. On June 3, experimental operations were resumed, the furnace in the meantime having been operated on the regular ores of the district. The variation in the charges and the periods of operations were as follows:

June 3 to June 5—One-eighth titaniferous ores.
June 5 to June 9—Three-sixteenths titaniferous ores.
June 9 to June 20—One-fourth titaniferous ores.
June 20 to July 31—Five-sixteenths titaniferous ores.

During this run of nearly two months malleable iron only was made. The following figures give some analyses of the iron made during each variation in charge:

Malleable pig iron made when one-eighth (⅛) titanium ore was charged:

	Per cent.	Per cent.	Per cent.
Silicon, Si	1.10	0.90	0.80
Sulphur, S	0.023	0.025	0.027
Phosphorus, P	0.168	0.174	0.166
Manganese, Mn	0.52	0.42	0.47
Titanium, Ti	0.178	0.468	0.436
Vanadium, Va	0.053	0.048	0.048

Analyses of the slag made at this time showed a percentage of titanium oxide (TiO_2) from 2.58 to 4.68 and of sulphur from 1.55 to 1.70 per cent. This slag contained about 31 to 34 per cent. of silica (SiO_2) and 10 to 11 per cent. of alumina and iron oxide ($Al_2O_3 + FeO$).

Malleable pig iron made when three-sixteenths (3/16) titanium ore was charged:

	Per cent.	Per cent.	Per cent.
Silicon, Si	0.95	1.05	0.77
Sulphur, S	0.023	0.038	0.029
Phosphorus, P	0.165	0.176	0.152
Manganese, Mn	0.51	0.48	0.47
Titanium, Ti	0.574	0.394	0.493
Vanadium, Va	0.071	0.058	0.071

Analyses of the slag showed a percentage of titanium oxide (TiO_2) from 2.96 to 3.22 and of sulphur from 1.75 to 1.85 per cent. This slag contained about 29 to 30 per cent. silica (SiO_2) and 7.50 to 10 per cent. alumina and iron oxide ($Al_2O_3 + FeO$).

Malleable pig iron made when one-quarter (¼) titanium ore was charged:

	Per cent.	Per cent.	Per cent.	Per cent.
Silicon, Si	0.95	1.00	1.30	1.35
Sulphur, S	0.025	0.023	0.029	0.015
Phosphorus, P	0.132	0.196	0.176	0.290
Manganese, Mn	0.53	0.68	0.59	0.21
Titanium, Ti	0.628	0.449	0.332	0.395
Vanadium, Va	0.066	0.066	0.080	0.080

Analyses of the slag showed a percentage of titanium oxide (TiO_2) from 5.65 to 7.10 and of sulphur from 1.65 to 1.80. This slag contained about 30 to 34 per cent. silica (SiO_2) and 10.74 to 13.75 per cent. alumina and oxide of iron ($Al_2O_3 + FeO$).

Malleable pig iron made when five-sixteenths (5/16) titanium ore was charged:

	Per cent.	Per cent.	Per cent.
Silicon, Si	1.50	0.70	1.70
Sulphur, S	0.036	0.041	0.03
Phosphorus, P	0.168	0.112	0.138
Manganese, Mn	0.50	0.42	0.40
Titanium, Ti	0.494	0.34	0.456
Vanadium, Va	0.108	0.106	0.114

Analyses of the slag showed a percentage of titanium oxide (TiO_2) from 9.02 to 10.21 per cent. and of sulphur from 1.45 to 1.70 per cent. This slag contained about 25 to 30 per cent. silica (SiO_2) and 12 to 15 per cent. alumina and iron oxide ($Al_2O_3 + FeO$).

FURNACE CHARGES AND PRACTICE

From June 3 to 20 the charge contained ¾ calcite and ¼ dolomite; from June 20 to July 6, ½ calcite and ½ dolomite; from July 6 to July 16, ¼ calcite and ¾ dolomite, and from July 16 on, ½ calcite and ½ dolomite. The slags, when ¾ calcite and ¼ dolomite were charged, were slightly more fluid than the slags made with non-titanium ores, using ½ calcite and ½ dolomite, which had been standard practice. An increase to ½ dolomite slightly increased the fluidity, and an increase to ¾ further augmented it. There was more tendency to high sulphur than with a charge of ½ and ½ dolomite and calcite.

In general, observations of slag temperatures averaged about 150 deg. F. higher than with non-titanium ores, though temperature observations previous to this were not entirely dependable. It was observed that sulphur can be higher in a titanium slag without as much sulphur going into the iron as compared with ordinary practice; it may be that titanium in this case is not as active an acid as silicon.

A comparison of furnace practice and conditions when working with ordinary Port Henry concentrates and when using portions of titanium ores is furnished in Tables 3 and 4, the figures for the former being based on operations in May, when normal Witherbee-Sherman ores were used, and for the latter on those in June and July, when the titanium mixtures were run. According to the common belief, high fuel consumption usually attends the use of titanium in the furnace, but the data here presented shows this not to have been the case in these experiments.

SOME PROPERTIES OF THE PIG IRON

Some of the pig iron produced during these experimental runs has been sold to various consumers but very few results had been reported at the time these data were collected as to the effect the titanium content may have on the metal made from it. As a rule, in iron foundry practice, it has been found thus far that the use of the titanium foundry iron will carry more scrap without chilling on the same silicon and produce a softer casting. The castings are also reported as being slightly stronger. When about 20 per cent. of this new iron is used to replace ordinary iron in a cast, tests on regular ½-in. square bars have shown an increase in strength of from 465 to 575 lb. as tested by the Titanium Alloy Mfg. Company. Taking irons of varying silicon content and comparing them with the titanium product of the same silicon percentage, the latter was the stronger.

The MacIntyre Iron Company made five casts of the titanium foundry iron and five casts of Buffalo iron, each set of the same silicon content, for comparison. After each was melted independently, 50 per cent. of stove plate scrap was added. Bars made from these experimental casts showed the titanium-bearing iron to be the strongest, but the increase was not large. The chill on remelted Buffalo iron with 2½ per cent. silicon was practically the same as the titanium iron with 1.80 per cent. silicon. Basic iron containing titanium is being used by some of the steel companies to determine the effect, if any, on the product.

Table 3—Furnace Data When Operating on Normal Ores.

Foundry iron	First week in May	Second week in May	Third week in May	Last 10 days in May
Yield per cent	64.13	63.13	63.15	60.06
Coke per ton of iron, lb	2,269	2,336	2,328	2,781
Stone per ton of iron, lb	772	807	964	1,376
Limestone, per cent of ore charged	22.10	22.70	27.20	36.90
Cu. ft. of wind per ton of fuel	55.60	53.70	55.10	58.80
Total make of iron, tons	1,602	1,636	1,611	1,881

Table 4—Furnace Data When Operating on Titanium Mixtures.

Malleable iron.	First week in June	Second week in June	Third week in June	Last 9 days in June	First week in July	Second week in July	Third week in July	Last 10 days in July*
Yield per cent	56.78	59.87	55.55	57.52	59.16	57.34	63.40	66.29
Coke, per ton of iron, lb	2,260	2,403	2,255	2,365	2,246	2,354	2,453	2,272
Stone per ton of iron, lb	1,156	1,137	987	942	810	865	1,017	892
Limestone, per cent. of ore charged	29.30	30.40	24.40	24.20	21.30	22.10	28.7	26.4
Cu. ft. of wind per ton of fuel	62.50	60.60	63.00	63.20	61.80	66.30	57.4	62.0
Total make of iron, tons	1,511	1,415	1,369	1,688	1,466	1,287	1,383	1,745

*Stock in furnace deducted from materials charged.

The experiments have shown that the use of 25 per cent. or more of titanium concentrates in the furnace charge renders it difficult to make an iron containing 2 per cent. or more of silicon. It can be done when only one-eighth of the charge is titanium ore. This is due to the fact that titanium replaces silicon in the iron. The silicon in the iron added to one-half of the titanium content is about equal to the silicon content of iron made from ordinary ores under like furnace conditions. It is, however, considered rather surprising that so much titanium remains in the iron.

The furnace troubles that arose were unexpectedly few. They were confined to a short period when slag appeared at the tuyeres too quickly after the cast was made; it would not settle into the hearth, or rather the tuyeres would not clear themselves. The conditions resembled a dirty hearth. On July 22 the first indications of hanging or slipping manifested themselves but they were not excessive. No serious scaffolding took place during the run, and the slag was fluid and acidic, contrary to the general belief that the presence of titanium oxide causes a thick and infusible slag.

FINAL CONDITION OF THE FURNACE

The blowing out of the furnace took place on August 3. It was subsequent to September 1 that the Northern Iron Company cleared the hearth to an extent which enabled an examination of the interior. The reproduced drawing shows the hearth of the furnace, the solid line indicating the original brick work; the broken lines, the various layers of material found. This consisted, as can be seen, much more largely of cinder than of iron and graphite. Except in the outer layers graphite was notably absent.

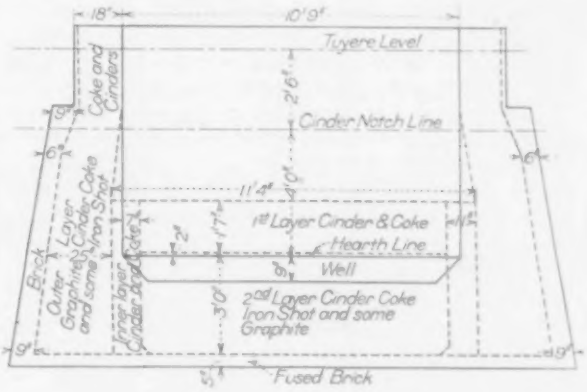
The result of the examination of the furnace is given in the words of the superintendent, F. E. Bachman, as follows:

Nitrocyanide of titanium was looked for very carefully, but none could be found in any place with the exception of possibly a few copper-colored crystals which one of the foremen reported having seen in the layer of fused brick in the extreme bottom. He, however, did not retain this so that the presence of this compound in any portion of the hearth is uncertain.

Samples of material from the various layers were submitted to the FitzGerald Laboratories, Niagara Falls, N. Y., with the request that they determine their melting points. They reported as follows: First layer 2372 deg. F., second layer 2570 deg. F., inner layer 2642 deg. F., outer layer 2498 deg. F. The temperature of slag flowing from the furnace was observed during the run and found ranging from 2460 deg. to 2885 deg. F. These temperatures were read with an optical pyrometer as the cinder flowed from the runner into the cinder ladles.

The condition of the furnace above the tuyeres was as follows: Beginning at the top, the top bricks were cut back a maximum of 8½ in. and a minimum of 6½ in. The inwall brick showed a wear of 4½ in. maximum above the mantel. On the thin wall section from the mantel to the top of the bosh where the lining was originally 13½ in. thick of hearth and bosh quality brick, the bricks were cut back till practically none remained. They were replaced on the upper 8 ft. with the usual carbon coating ranging from 2½ to 3½ in. in thickness. Below the 8-ft. point this carbon coating gradually increased in thickness until at the top of the bosh it was 6 in. This thickness was maintained until immediately above the tuyeres where it gradually thickened to the original 18 in. at the tuyere circle. The original thickness of the brick at the bosh was 9 in. There, however, was a small section of the bosh immediately over the iron notch and above the Nos. 1 to 12 tuyeres, which had been banked, for a long time previous to blowing out, where the carbon coating reached from 18 to 24 in. in thickness on the bosh walls.

After blowing out, a distinct ring was noted attached to the carbon lining at a point 17 ft. above the tuyeres. This ring was 6 to 8 in. thick and about 1 ft. high. About 36 hours after the wind was off it fell with the exception of a section of about 5 ft. in length, breaking into coke and dust. This 5-ft. section seemed to have been attached to the carbon coating more



Cross-Section of the Hearth of the Furnace at Port Henry after the Run on Titaniferous Iron Ores. The Solid Lines Indicate the Original Brick Work. The Dotted Lines, the Various Layers of Material as Found

tightly. On its removal a smooth wall showed behind it. The furnace had been blown down to a level 3 ft. below the bottom of the ring referred to. From this point to the tuyeres some coke adhered to the carbon coating; on its removal a smooth wall was shown behind it. Whether or not this was in place before the furnace was blown out, I am not able to judge; in no place was it over 12 in. thick.

This series of tests has excited wide attention among the blast furnace men of the country and visits to the plant from among those interested have been numerous.

Waterbury's Varied Products

The Chamber of Commerce of Waterbury, Conn., has issued an interesting illustrated folder which sets forth the industrial importance of the locality. The folder gives especial attention to the great diversity of the industries of that city, which is chiefly known to fame because of its being the greatest center engaged in the manufacture of brass and copper goods. The slogan adopted by the Chamber of Commerce is "Waterbury Has Something on Everybody." The reason for the adoption of this slogan is set forth in the following description of the varied character of Waterbury products:

Brass ware, brass and copper rolled, bread and bakery goods, buttons of every description, carriages and wagons, electrical machinery and apparatus, foundry appliances and machinery, automatic machines of every description, hardware, etc., lumber, doors, casings and all kinds of dressed lumber, mattresses, spring beds, mineral and soda waters, printing and book-binding, sausages, stamped ware, silver and silver plated ware, tobacco and cigars, awnings, tents and sails, boot and shoe finding, boxes, fancy and paper, brass castings, brass finishing, clocks, Ingersoll watches, women's clothing, confectionery, coppersmithing and steel and iron work, cutlery and edge tools, flour and grist mill products, gas and electric lamps, fixtures and chandeliers, grease and tallow, hosiery and knit goods, instruments (both measuring and recording), professional and scientific instruments, iron and steel forgings, lamps and reflectors, malt liquors, marble and stone, models and patterns, monuments and tombstones, needles, pins, hooks and eyes, paint, patent medicines and compounds, rubber and elastic goods, soap, stationery, chemicals and acids, tools, upholstering materials, wire, wire rope and cable, insulated wires, seamless and brazed copper, brass and German silver tubing, wood, turned and carved.

STEEL ORE STOCKING TRESTLE*

An Interesting Permanent Structure in the Lake Superior Iron District

BY STUART R. ELLIOTT†

A common method of stocking iron ore is by the gravity system, extending the tracks on the pile of ore as it advances. The tracks are laid with sufficient grade to run the cars to the end of the pile. The cars are brought back either by a puffer or by trammers. For handling a large product this system is often not practical, as the necessary grade reduces the hight of the pile and therefore its capacity. The tracks are difficult and expensive to maintain and keep in proper alignment. Delays in hoisting are frequent and expensive. Also where the available stocking room is limited, often the gravity system cannot be considered. It has been proved at mines of large production that it is more economical to erect wooden trestles and to use some mechanical means of stocking. On the other hand, the cost each year for erecting and dismantling wooden trestles is heavy. With certain classes of ore the yearly breakage in legs will amount to as much as 33 per cent. An actual record kept of a trestle at a large mine shows that in six years not a single stick of the original timber was in use. The price of timber and trestle legs is steadily increasing and it is only a matter of a limited time when legs will be difficult to procure at any price.

In 1909, when it was found necessary to sink a new shaft at the Negaunee mine, I began to collect data in order to make some preliminary estimates as to the comparative cost of wood and steel. Several sketches of steel trestles were submitted to J. F. Jackson, of the Wisconsin Bridge & Iron Company, who prepared some sketches and submitted approximate estimates for steel trestles. Comparative estimates made from these showed conclusively that if a practicable steel trestle could be constructed, it would mean a large saving for any mine which had a life of 10 yr. or more. The Wisconsin Bridge & Iron Company was asked to make final drawings and to submit bids for a steel trestle, which were accepted and the trestle constructed.

The average wooden trestles used by the Cleveland-Cliffs Iron Company cost approximately $6 per ft. The cost for labor each year in erecting and dismantling amounts to $1.20 per ft., and the entire stocking trestle has to be renewed in about 6 yr. A wooden trestle must be dismantled to load the ore with a steam shovel. A permanent steel stocking trestle would provide against delays, as the tracks would not have to be disturbed to load with steam shovels and it would therefore be possible to stock ore at any time. On a steel trestle permanent tracks could be maintained in the best possible condition for stocking and the tracks being in perfect alignment, no delays would be caused by cars falling from the trestle. For all of the above reasons, but particularly on account of the large saving in money over a long period of years, it was decided to install a permanent steel trestle at the Negaunee mine.

A Recently Completed Ore Stocking Trestle at the No. 3 Shaft of the Negaunee Mine. It Is Thought To Be the First and Only Permanent Structure Erected for the Purpose

At intervals of 114 ft. there are concrete columns, the upper part for a distance of 28½ ft. being 4 ft. in diameter and the lower 10 ft. belling out to a diameter of 6 ft. at the bottom. The shells of plate are ¼ in. thick. They rest on and are bolted to pyramid-shaped reinforced-concrete bases which are 12 ft. wide, 26 ft. long and 6 ft. deep. Each base is reinforced by 52 rods ⅞ in. in diameter which radiate in all directions through the base and extend up into the shells for a distance of 20 ft. The rods were all bent so as to extend to the proper points in the bases and to project to the correct hight in the shells. In the bottom of each pyramid the rods were tied to seven old rails which extend across the long dimension. At a point about 20 ft. above the base the rods were attached to and dis-

*From a paper prepared for the Marquette Range meeting of the Lake Superior Mining Institute, August 31-September 3.

†Local superintendent, the Cleveland-Cliffs Iron Company, Negaunee, Mich.

tributed around two horizontal rings in the shells. Above these rings other rods were spliced so that the reinforcing extended to within a few inches of the top of the columns. Across the center of each column are two short plate girders, each 38 ft. in length. Between these short girders are two other girders 76 ft. long, thus making the total span of 114 ft. On top of each column the girders rest on horizontal 8-in. I-beams supported by four braces firmly connected to the columns which extend down at an angle of 45 deg. The plate girders are made up of angles and two plates 42 in. wide and ¼ in. thick. The distance from center to center of girders, or center to center of tracks, is 20 ft. The entire length of the part of the trestle from which ore can be stocked is 2094 ft. In addition there are 500 ft. of curved trestle extending from the shaft and connecting with the stocking trestle. The legs in the curved part are built up of angles and channels. The stringers are channels and I-beams of various sections. On top of the I-beams are holes to which are bolted 5-in. nailing strips. The 40-lb. rails on the plate girders are spiked to ties 4 ft. in length. On the outside of the girders the ties were bolted to 4 x 4-in. timbers placed snugly up against the girders to prevent shifting in the track at right angles to the length of the trestles. To prevent the ties from creeping, they were attached at intervals by hooked bolts to the small angles inside of the girders. The tracks are now in as good alignment as when first put in about 2 yr. ago.

The trestle was built under a guarantee to support a movable load of 10 tons. It was put into commission during the fall of 1912 and has been used continuously since then. No defects in construction or design have been discovered. No delays in loading with the steam shovel have been occasioned. With the wooden trestle there is considerable delay in pulling out legs, consequently ore can be loaded more rapidly from the steel trestle.

At the shaft the ore is dumped during the stocking season into special saddleback cars of about five tons capacity. These cars are operated by the tail-rope system, the power being furnished by two 75-kw. motors. The cars are of special construction and dump automatically simply by running over a dump-jack placed between the tracks at the desired point on the trestle. This releases the catches and allows the doors to open. By shifting a lever on one end of the car, three grades of ore can be stocked from each track. On top of the plate girders, between the rails, the ⅝-in. rope is carried on wooden rollers. On the end of the trestle it passes around a roller-bearing sheave 2 ft. in diameter. Below the tracks the return rope is supported on small sheaves placed at intervals of about 30 ft. The slack is taken up by four special tighteners which are placed at the end of each track. The tightener consists of a truck, to one end of which is attached a 2-ft. roller-bearing sheave and from the other a rope, which passes over a stationary sheave to a large iron bucket suspended below the trestle. The slack in the rope is controlled by putting the proper weight in the bucket. Placing the tighteners at the end of the line rather than near the winding drums at the shaft house has been found to be a great improvement.

The cost for erecting and dismantling was accurately kept at two large mines for a period of years. It was found to amount to $1.20 per ft. and under unusual conditions this has run as high as $1.60. The portion of the trestle between the shaft and the point where ore is stocked is usually called the permanent trestle, the other part being the stocking trestle. The permanent trestle is put up in a very substantial way and is expensive, costing as much as $15 per ft. After a period of 10 yr. this permanent trestle is sure to be in bad repair. A few of the stringers not directly below the tracks will probably last for a short additional time, but for the sake of an estimate it can be assumed that the permanent trestle will have to be entirely rebuilt in 10 yr. In making a comparative statement of the cost of wood and steel, the expenditure each year at 6 per cent. compound interest has been used. This yearly expenditure has been accumulated and figured at compound interest for a period of 20 yr. It is found that at 6½ yr. the costs for wooden and steel trestles of the same length are practically identical. As the time increases the accumulated amount for repairs, renewals, erecting and dismantling, figured at 6 per cent. compound interest, increases very rapidly. At the end of 20 yr. the saving in favor of the steel stocking trestle is $117,000. It is impossible to estimate the saving due to better tracks and operating conditions and consequently the minimizing of delays on the surface. With a wooden trestle a certain number of carpenters and extra laborers must be employed. Only a part of their time can be charged against the stocking trestle, but it is nevertheless necessary to have them so that they can be used when repairs are needed. At the Negaunee mine there is only one carpenter, whose entire time is spent in the shop.

Compound Table for Drilling Machines

For use on its 20, 21, 22 and 25-in. vertical drilling machines, the Aurora Tool Works, Aurora, Ind., has developed a new compound table. It has an adjustable support which is raised and lowered by a handwheel and the form of the support has been changed from the square section formerly employed.

An Improved Type of Adjustable Compound Table for Vertical Drilling Machines

The table can be raised and lowered to any hight within the range of adjustment provided to suit the requirements of individual cases. The adjustable support is relied upon to prevent any springing of the table arm and to maintain the proper alignment under very heavy cuts. A large circular flat bearing is provided as well as a long pivot bearing on the column. In addition to a lateral movement of 7¼ in. and a longitudinal one of 9¼ in., the table can be swiveled to any desired angle. A set of four T-slots is provided in the base for fastening the adjustable support in place when the table is swiveled around the column.

Plans are reported under way for the rehabilitation of the finances of the Alton Steel Company, Alton, Ill., placed in the hands of a receiver early in the summer. The plant is not now being operated but it is understood that H. C. Fownes, who is heavily interested in the company, will take steps to resume.

Selecting Refractories for the Foundry*

What Are the Desirable Properties of Bricks for Air, Annealing and Brass Melting Furnaces, Converters, Ovens, Cupolas, Etc.?

BY WALTER H. KELLEY†

Every superintendent of a foundry insists on knowing the analysis of the coal he is using, while but few investigate the analysis and physical characteristics of their fire brick and fire clay requirements. All fire clay brick are essentially silicates of alumina and expressed in the lowest terms are composed of the two varieties of clay, namely, the hard, flint or block clay, as it is often termed, which forms the real body of the heat-resisting material, and the soft or plastic clay, acting as a bond to give physical strength to the brick. As conditions may warrant, a larger or smaller portion of the hard clay may be calcined previous to its manufacture into brick. Upon the character of these clays, the fineness to which they are ground and the degree of burn given them, depends the character of the brick. In general, a fine ground, hard burned brick gives superior results in the side walls and a more porous, open, and if we may term it, "elastic" brick does better in arch work. There is here given a fairly representative analysis of a high grade Pennsylvania fire clay brick, cited as being merely typical.

	Per Cent.
SiO_2	52.93
Al_2O_3	42.69
Fe_2O_3	1.98
CaO	.33
MgO	.38
Alkalies	1.55

It has been demonstrated, other things being equal, that as the percentage of silica increases in a fire brick, the refractoriness decreases, the excess of silica being in a free state and uniting with such impurities as may be present, lowering the fusion point of the brick. The theoretically perfect fire clay, a true silicate of alumina, will show in accordance with the oxygen ratio the following: Alumina, 53.27 per cent. and silica, 46.73 per cent. Such a pure silicate of alumina does not, of course, occur in nature, but as a general rule, the nearer the silica and alumina are to these proportions, the more refractory is the material.

Analyses of fire brick taken from various foundries where trouble has been encountered have shown from 59 to 73 per cent. of silica, or an even higher percentage. Of the majority of clays used in foundries such analysis indicates that they are made from so-called top vein clays, lying above the coal measures, and such as are more commonly used in the manufacture of sewer pipe, building brick or fireproof material.

ANALYSIS NOT THE ONLY CRITERION

Nevertheless analysis alone does not tell the story as to how any given clay or brick will work out in your furnaces, in the side walls, for instance, where it encounters high temperatures, the scorifying action of the slag and cinder and the wear and tear of the slice bar or poker. Nor will it tell the results in the arch, often subjected to the most intense heats, with forced or induced draft, with mechanically fired furnaces and with fuels of various kinds.

The physical structure of the brick should also be considered in making decision as to its selection. Where bituminous coal is used as the fuel, it has been found that a hard dense brick of higher refractoriness gives the best results in the side-walls, especially along the clinker line. The importance of using a brick of the proper physical and mechanical composition in side-walls has brought about the introduction of bauxite for this portion of the furnace construction. While they have not as yet probably been given an adequate test, their adoption bids fair to later become a factor in the selection of the material used in lining at least portions of the several different kinds of furnaces in your equipment. It will be dwelt upon more fully later.

Ordinarily a brick used in the arches should be of not too hard a burn and of a comparatively coarse grind, as a brick of this kind will better withstand the sudden changes of temperature encountered. There are, of course, variations to this rule, as with the use of anthracite coal with blast or forced draft, where the physical structure of the brick should be dense and hard to better withstand the cutting action of the fast-moving gases of combustion.

Care should be exercised in selecting a fire clay for laying up the brick-work of a refractoriness corresponding with the brick. When a manufacturer of a high-grade brick begins to insist that it should be laid up with a clay corresponding in refractoriness his motives are not invariably looked upon as altruistic, but it is a common error to use so low a grade of clay that its plasticity must be reduced by the mixture of sand to give a sufficient sharpness to work the material. In such a case the joints may often melt and run out while the brick themselves would be unaffected. Any addition of lime, mortar or cement should be avoided, not so much because of the injury done by a very small percentage of this material, as because of the fact that any given percentage is in practical working very often doubled or tripled, due to carelessness in proportioning the mixture.

REFRACTORIES FOR AIR FURNACES

Air furnaces are particularly severe on fire brick. This is due not so much to the high heats attained, as to the intermittent operation of this type of furnace. The highest grade of fire brick obtained is none too good and care should be exercised in the selection of brick of the proper burn to withstand the variable conditions occurring during the operation of the furnaces.

Hard-burned and fine-ground brick should be used in the side-walls of these furnaces to better withstand the impinging effect of the flames against the walls, deflected, as they are, from the stock which, when originally charged, is very bulky and takes up considerable of the space of the melting zone. Medium-burned and coarse-ground brick should be used in the roofs to overcome spalling and to withstand the variable temperatures naturally occurring.

Considerable of the difficulties with the clinker

*From paper presented September 8 to the American Foundrymen's Association, Chicago.

†Harbison-Walker Refractories Company, Pittsburgh.

of the fuel bed adhering to the sidewalls of the combustion chamber have been overcome by the use of a steam-pressed brick along this clinker line. The use of bauxite brick and steam pressed brick has also overcome to a very considerable extent the scorifying action of the slag of the bath upon the sidewalls of the melting zone.

The sidewalls of this type of furnace have to be repaired very often, due to the action of the slag of the bath cutting out the brickwork wherever it touches and thus undermining the upper portion of the walls.

ANNEALING FURNACES

As the temperatures employed in annealing furnaces will vary from only 1000 to 1500 deg. or possibly a little higher, a second quality brick is used almost entirely throughout excepting in furnaces of great width and where the flame of combustion has to carry a considerable distance. Here it has become necessary to use a first quality brick in the fire boxes of those that are coal fired on account of the higher temperatures necessary to carry the heat across the furnace.

The best practice is to install the bottom of these furnaces with tile 12 in. in width and 5 in. thick, varying in length from 12 to 18 in. These tile are made as tough and dense as it is practical to make them, so that they will stand the wear and abrasion encountered in the charging of the furnace. As each of these blocks covers a larger area than a standard size 9-in. brick, they afford a more even surface and considerably reduce the number of joints in the brickwork of the bottoms.

BRASS FURNACES AND STEEL CONVERTERS

In brass melting furnaces of the pit type wherever a crucible is used and where coke or oil is ordinarily the fuel, a highly refractory brick of medium coarse grind and of a good strong burn give the best results. A brick with these characteristics will better resist the action of the fused coke and the deposits from the oil.

In the tilting melting type of furnace the most refractory fire clay brick obtainable is required to secure good results. The brick should be of dense structure and of hard burn to resist the action of the oil and air which are admitted usually under very heavy pressure. The slags created are very scouring in their action and consequently do not permit of the use of an open or coarse grained brick. Specially shaped brick are usually required to line this type of furnace, to overcome the number of joints occurring when lined with standard brick. A good many of the above furnaces are lined with ganister, which makes a very satisfactory lining material as it can be repaired very handily.

In steel converters the lining most generally used is silica brick, while there are a number lined with ganister, which is a mixture of practically pure silica grits and a refractory clay, which is rammed around wooden forms. Many of these converters are first lined with silica brick, to the surface of which is then added a coating of about three inches of ganister. I know of some converter linings thus installed that have given over eighteen months' service.

In crucible steel melting furnaces which are usually of the regenerative type, the use of silica brick is rapidly replacing clay brick in the lining of the melting zone. Where formerly there was obtained about four to six months' service with the clay brick lined furnaces, we have records of furnaces lined with silica brick giving a life of from 36 to 45 months, the average life of these furnaces to-day is from 14 to 18 months.

BRICK FOR THE CUPOLA

Brick to be used in cupolas should be dense, hard, tough and very refractory. Blocks for lining around the bottom of the cupola and for a distance of four feet or so above the tuyeres should be made of flint clay high in alumina, with sufficient bond clay to make the brick strong and tough. The manipulation of the clay and the mix, grind and burn have to be carefully considered to secure the maximum heat resisting capacity, together with ability to stand the cutting action of the blast and the wash of metal and slag. From a distance of about 2 ft. above the tuyeres to the charging doors the blocks should be made to withstand abrasion, as well as heat and they should be exceedingly dense, hard and strong.

LININGS FOR THE ELECTRIC FURNACE

In the electric furnaces silica brick are used entirely, excepting where basic steel is produced; the latter requires that the bottom and sidewalls be constructed with magnesia brick to withstand the action of the basic materials charged into furnace. It is surprising how well these brick have withstood the severe treatment given them in this type of furnace. While we all appreciate that silica and magnesia brick will spall severely when subjected to sudden changes of temperatures and fully realizing the intermittent operation of these furnaces, still we would not consider any other refractory material than silica or magnesia brick to withstand the high temperatures occurring therein.

The life of the lining of an electric furnace is at the best a very short one and considerable of the difficulty with the short life of these linings is due to a very considerable extent to the unnecessarily high temperatures often attained. While they have all sorts of devices for registering the voltage and amperes required during the melting of a charge, there is very little attention given to the temperatures attained. In fact, there is no instrument that can be depended upon to record accurately the high temperatures that no doubt are often attained during the operation of the furnaces. I have heard operators of these furnaces state that they judge the working temperature to be slightly over 1900 deg. C. This would mean a temperature of about 120 deg. Fahr. beyond the fusion point of the brick. I have seen the original lining of an electric furnace run for 48 consecutive days and the four or five subsequent linings would last from five to ten days.

SEVERE CONDITIONS IN MALLEABLE FURNACES

Regarding malleable furnaces this practice is about the most severe of any on fire brick. The life of these furnaces is referred to in the number of heats and not days or weeks, and is governed by the service obtained from the brick in the sidewalls, as the roof sections or bungs are often renewed during the operation of the furnace.

Fine ground and hard burned brick should be used in that portion of the sidewalls as high up as the slag line reaches. Hard burned and highly refractory brick should be used in the balance of the sidewalls to resist the impinging effect of the gases of combustion and coarse ground and light burned brick should be used in the bungs to better withstand the variable temperatures naturally occurring in this practice where coal is the fuel most generally used.

The Ohio Valley Enameling & Stamping Company, Bellaire, Ohio, has been incorporated by M. L. Blackburn and others. It is stated that this company will be a selling agency for the American Stamping & Enameling Company in Bellaire.

HEAT CONTAINED IN SLAG

Its Utilization as Steam in a Specially Designed Apparatus

Among the papers prepared for the fall meeting of the Iron and Steel Institute in Paris, which was postponed, was one by Walter L. Johnson, Clarence Iron Works, Middlesbrough, England, on "The Utilization of Heat Contained in Slag." An abstract of this follows:

Some four years ago Bell Brothers, Ltd., renewed experiments with a view to using the steam, produced from slag, in a low-pressure turbine. The apparatus employed, as shown in the illustration, consisted of a wrought-iron circular vessel, B. Near one edge of the top plate of the granulator B was the hole through which the slag was poured C; on the underside of this top plate and around the hole a circular ring, 4 in. deep, was fixed which dipped into the water to a depth of 3 in., thus forming a hydraulic seal and preventing the steam from escaping. Inside the granulator were four vanes on a vertical shaft D, which caused the water to rotate.

The slag came from the furnace along the trough or channel A, and when the slag dropped into the water it granulated, its velocity causing it to sink to a certain depth. It floated for a time, but the rotation of the water caused it to come to the surface inside the vessel, otherwise it would have blocked up the slag entrance. The granulated slag was then lifted by the elevator E into a second seal F, and there, becoming waterlogged, it sank through the seal and was taken by a second elevator and dropped into trucks. The feed water was introduced along with the slag at C. The surplus water which drained from the truck was also pumped back to C by a small pump fixed at the side of the apparatus. The steam generated came off at G.

At first it was intended to use this steam direct in an exhaust steam turbine, but after numerous experiments on blades of different metals a 50-kw. turbine with blades of duraluminum was experimented upon. This plant was run for two months, and it was then found that the turbine was partly blocked with fine sulphur which had caused some wear of the blades. The direct method was then abandoned and a water heater and heat exchanger were introduced between the turbine and the primary generator. The water heater consisted of an outer casing and tube plates with tubes 1¾ in. in diameter fixed therein, giving a total heating surface of 156 sq. ft.

The water in the tubes was caused to boil by the steam with which they were surrounded, and as ebullition took place a column of vapor ascended

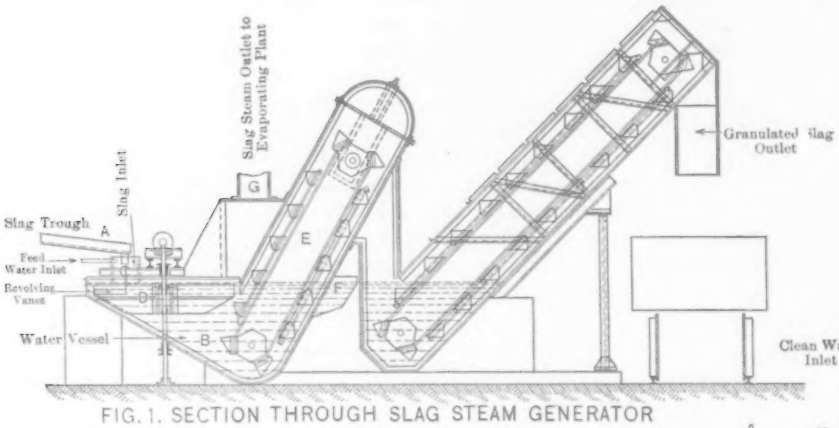


FIG. 1. SECTION THROUGH SLAG STEAM GENERATOR
ELEVATION

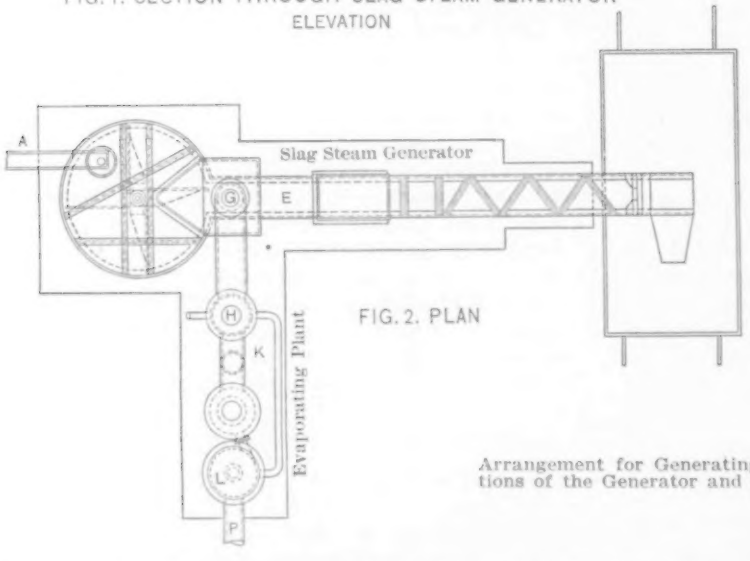


FIG. 2. PLAN

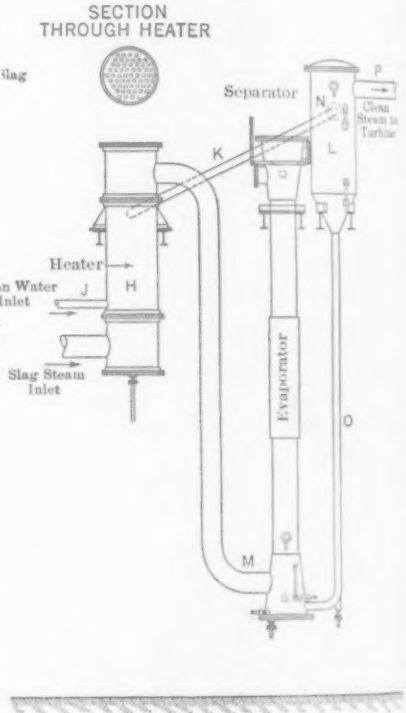


FIG. 3. EVAPORATING PLANT
SIDE VIEW

Arrangement for Generating Steam from Slag Showing Sections of the Generator and a View of the Evaporating Plant

the center of each tube. This vapor traveled at a high velocity, carrying with it a film of water on the inner surface of the tubes. As a result a certain amount of water was carried up into the separator L, which acted as a steam drier; this water and the feed water from the heater, which entered at N, flowed down the pipe O, entering the calandria at the bottom. The clean steam was delivered by the pipe P to the turbine which was connected with the condenser in the usual manner.

The heating surface of the calandria was 548 sq. ft. A vacuum of about 9 in. of mercury was maintained in the separator so that the water boiled at 90 to 91 deg. C. With steam from the slag at 100 deg. C. and keeping a temperature in the calandria of 91 deg. C., the mean of 22 experiments gave 173 gallons of water evaporated per hour, and the average steam per hour condensed in the calandria and

heater was 190.2 gallons. The feed water entered the heater at an average temperature of 24.6 deg. C., and reached the calandria at an average temperature of 89 deg. C. With the steam from the slag at 100 deg. C. and the temperature at 90.50 deg. C., the mean of 27 experiments gave 177.2 gallons of water evaporated per hour, and the total steam condensed in the calandria and the heater was 198.3 gallons per hour. The average temperature of the feed water was 26 deg. C., and of the water entering the calandria 89 deg. C., or 89.4 lb. of water were evaporated for 100 lb. of dirty steam.

As the condensation of dirty steam took place, the percentage of incondensable gases naturally increased. When the percentage got above 7.5 the calandria began to lose its efficiency, and it was advisable not to allow that percentage to be exceeded.

Other experiments made to determine the amount of steam available from the slag showed 1017 lb. per ton of slag, and of this amount 855 lb. of clean steam were available for the turbine. With exhaust steam turbines working at a vacuum of 28½ in. this gave 31.6 hp. per hour per ton of slag per hour. It was not possible to give the cost of running such a plant because the practice at different works varied considerably.

HANDLING CORROSIVE LIQUIDS

Copper-Steel Piping and Ferrosilicon Values for Resisting Action of Acids

BY G. C. CLIFFORD

One of the problems in certain lines of manufacturing is the handling of corrosive fluids, acid liquor, etc. These fluids are extremely troublesome; the pipe lines carrying them are corroded rapidly; leaks are likely to cause damage of a more or less serious nature; any valves in the lines are hard to keep tight, and as a result the fluid may flow into tanks where it is not desired. In a plant where such liquors had to be handled in large quantities, the pipe lines were so troublesome that a number of experiments were made to find materials which would resist the action of the fluids. The original lines were installed with brass valves and steel pipe and gave trouble at the joints, particularly where the surface oxide was cut through in threading the pipe. The joints at the valves developed trouble in the shortest time and caused a suspicion of electrolytic action, but the action was so rapid that a line only lasted a few weeks. In an endeavor to cure the trouble, wrought iron pipe was used and though it lasted a little longer than the steel pipe the life of the pipe line was very short.

Copper alloy steel was suggested as a piping material and the photographs show the results of comparative corrosion tests of wrought iron pipe and 0.50 per cent. copper-steel alloy pipe. The two samples were threaded and fitted with copper nuts to try out the electrolytic theory at the same time. The samples were then placed in beakers and covred with a 2 per cent. solution of sulphuric acid. The photographs, which are slightly enlarged from the actual samples, show the result of two weeks' immersion. The wrought iron sample is very badly corroded at the thread while the copper-steel alloy shows no more corrosive action at the thread than it does on the normal surface of the pipe. This is particularly exemplified in the end view where the acid has eaten down in the fibrous structure of the wrought iron, while the copper-steel alloy still shows the marks of the cutting-off tool.

The valves in these lines were also very troublesome, sometimes giving out in as short a time as two weeks, and a variety of bronzes and brass alloys were tried with little success. Ferrosilicon valves and plugs were finally tried and while con-

Results of Two Weeks' Immersion in a 2-Per Cent. Sulphuric Acid Solution of a Wrought-Iron Pipe, at Right, and a Copper-Steel Alloy Pipe, at Left

siderably more expensive in first cost their resistance to the corrosive action seemed to warrant their use.

As a result of the experimenting the pipe lines carrying acid liquor have been reconstructed with ferrosilicon valves and copper-steel alloy pipe and after nearly one year's use have given no signs of failure. The longest life of previous pipe lines had not exceeded two months, so that the saving in repair and reconstruction, to say nothing of the elimination of interruption in manufacturing processes, has been considerably more than the increased cost of the pipe lines.

The Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa., has placed on the market a new type of ventilating fan that differs from the older style in having a large number of blades which are mounted on a wide central disk and have the ends turned up abruptly. It is claimed for this design that the air is thrown straight forward at a high velocity instead of being widely diffused and that the fan is quiet and very efficient in operation. The flowing back of air through the center of the fan which sometimes happens with the old type is also eliminated. The motor employed is of a special design inclosed to provide protection against dust, dirt, moisture, etc. It will run for long periods of time without attention, requiring only an occasional inspection and lubrication.

Contracts have been placed for an extension to the plant of the National Rolling Mill Company, Mansfield, Ohio, which has been acquired by W. H. Davey, who will be general manager, and others. Orders have been placed for new equipment, including an 1800-hp. mill engine, a water heater, boiler feed pump, three stands of rolls, three heating and two annealing furnaces, a pickling machine, 25-ton crane and other equipment. A complete machine shop will be installed for repair work. It is the intention to have the plant ready for operation December 15.

National Council for Industrial Safety

Action Favoring Total Abstinence Among Factory Workers—Economic Side of Safety Work—Congress Last Week in Chicago

Standardization of safety practices, perfecting of safety organizations, educating workmen in habits of safety and condemnation of intoxicating liquors as the most prolific cause of accidents were important questions discussed at the third annual safety congress of the National Council for Industrial Safety. The meetings, preceded by committee conferences, were held in Chicago October 13 to 15, continuing from 9.30 a. m. to 6 p. m. and attended by over 400 delegates.

The sessions impressively reflected the inspirational character of the cause. It is, at the same time, worthy of comment that the men who are engaged in the organized efforts for safety are engineers; men to a great extent of mature experience in dealing with labor; physicians, and Government officials. Springing from an idea of but limited scope, this congress demonstrated that safety in industry has become a national movement and has enlisted the activities of an enthusiastic, progressive and experienced class of men.

THE PRESIDENT'S ADDRESS AND COMMITTEE REPORTS

President Robert W. Campbell, in his address at the opening session, reviewed the progress of the organization during the year with respect to membership and finance and pointed out the urgent desirability of a co-operative effort for membership in the coming year. In addition to a long list of specific undertakings initiated by the council, Mr. Campbell stated that following a conference the United States Commission on Industrial Relations had made a co-operative arrangement with the council to effect a constructive analysis of the status of accident prevention work as undertaken by the State and Federal governments, public institutions and industrial organizations. A corps of men who are now in the field making investigations has been placed at the disposal of the council. Co-operative effort has also been inaugurated in conjunction with the Conference Board on Safety and Sanitation, the national trade associations and other established organizations which are working in the general advancement of safety. It was the president's recommendation that effort for the year be pushed still farther in the educational effort in interesting the small manufacturer in the standardization of practices and in the perfection of both plant and general organization to the end that there may be combination rather than duplication of work.

Among the committee reports, those on accident statistics and standardization, in particular, showed definite progress. In gathering accident statistics one great difficulty has been the lack of uniformity in the basis for reports at various plants, with the result that it has been almost impossible to reduce individual reports to the common terms of general statistics. Agreement has now been reached upon the definition of what constitutes a preventable accident, the length of the period following the accident in which report must be made, and a number of other limitations which will more clearly define the meaning of accident statistics.

The committee on standardization submitted a comprehensive report proposing tentative standards for safety. This is intended to cover all ordinary plant requirements for safety and, when finally accepted, is to be urged as a guide for the equipment of all industrial plants. A conference was held on this report and suggestions were received from the various trade associations with the result that the report was referred back to the committee and an invitation extended to all those interested to present in writing their recommendation bearing upon the suggested standards.

PARTICIPANTS IN THE GENERAL DISCUSSIONS

Royal Meeker, commissioner of labor statistics at Washington, who presided at the Tuesday afternoon session, urged the more general use of the statistics compiled by the bureau at Washington and printed for public distribution. H. M. Wilson, engineer in charge of the Bureau of Mines at Pittsburgh, speaking of "Co-operation for Safety by Government and Industries," pointed out that the intimate knowledge and industrial atmosphere represented by the National Council, with the broad experience, unbiased authority and influence of the Government, are highly necessary and desirable. In a lengthy paper, Dr. John Price Jackson, commissioner of labor for Pennsylvania, who arrived in Europe just as war was declared, described what Germans have done in fostering accident prevention. Speaking of Government agencies for accident prevention, Barney Cohen, of the Illinois Department of Factory Inspection, emphasized the need of standardization of safety practices and requirements and said too much is left to the discretion of the inspector and that the best results cannot be obtained unless the inspectors have a definite notion of what is required and can insist upon it.

In opening the Tuesday afternoon session, Dean Connelley, of Carnegie Institute of Technology, held up as the particular need in the education of the engineer today a clearly defined knowledge that human life is worth more than a machine, and that the greatest resource of the country demanding conservation is human life. The need of a specialized course in safety engineering has now, he said, become pressing. Miss Ida M. Tarbell's talk upon the effects of safety on humanity was commented on in last week's issue. One of the especially interesting papers was that of Dudley R. Kennedy, Youngstown Sheet & Tube Company, discussing "Efficiency in Safety Work." In the attainment of efficiency, he urged as a first essential the appointment of a safety director in every plant where 500 or more men are employed. He also urged the appointment of general safety committees with departmental committees also operating. He laid stress upon the desirability of physical examination of employees and illustrated the depth of ignorance which characterizes so large a proportion of our foreign labor population with regard to machinery. He stated that there is no longer any doubt that intoxicants are a direct contributory cause of acci-

dents, and he urged the most vigorous action for the prevention of drinking among employees, at least in the hours of work.

THE ROUND TABLE TALKS

Perhaps the most interesting and helpful sessions of the congress were the round table discussions held on Wednesday and Thursday mornings. At these the men actually conducting safety work discussed informally means for accomplishing better results. Dr. Frederick Hoffman stated that 25,000 were killed annually in the industries of this country and 300,000 injured. Since the inauguration of Safety First, the Lackawanna Railroad had reduced the number of its accidents 40 per cent. and the International Harvester Company, 68 per cent. R. J. Young, of the Illinois Steel Company, said that they are now considering the question of "gang safety" men, so that the influence of the safety work may be carried throughout the entire working organization.

H. P. Smith, of the Joliet works of the Illinois Steel Company, told how they employ linguists to tell workmen in their own language what is wanted and what benefits are to be gained; how they carry the safety propaganda into the home; how they have adopted the plan of showing to the school children moving picture films to impress upon them lessons of safety, and how there has been posted, as mentioned in *The Iron Age* some months ago, a notice stating that the use of liquor is thoroughly discouraged and that men will be chosen for promotion only from the ranks of those who abstain from intoxicants. Mr. Robinson, Eastman Kodak Company, Rochester, N. Y., described how they put up new questions to the men for decision, maintained a system of inclosing messages in pay envelopes, presented to the employees an ornamental tie clasp to avoid the danger of flowing ties being caught in machinery, and conducted a suggestion box with cash prizes. M. A. Dow, of the New York Central Lines, urged the development of responsibility in the small boss.

MACHINERY MAKERS SUPPLYING SAFEGUARDS

At the Thursday morning round table discussion, it was suggested that the manufacturer of machinery incorporate into the design of his machine the necessary safeguards which should then form an integral part of the machine as it is sold. Criticism was made that the user of the machine is in a better position to determine how it should be guarded after it has been installed and he brings to bear a greater experience in the use of the machine.

Mr. Hansen, representing one of the insurance companies, said his company was considering penalizing in its insurance rates any manufacturer that permits a saloon within 1000 yd. of the plant.

ECONOMIC PHASES OF SAFETY WORK

Mr. Avery, Avery Company, Peoria, stated that under the compensation laws insurance would cost them $3.30 per man per year, which was prohibitive. They lay stress on the employment of healthy and physically fit men. It is necessary, for one thing, to have an initial record of each employee's condition to check the amount of disability in case of injury. As the result of their work, 94.9 per cent. of all injuries in the past year resulted in no lost time. To the average employee the loss of an hour is equivalent to 20 cents; to the employer who makes a profit on the man's work, 40 cents. The compensation laws require the payment of 50 per cent. of a man's wages, so that for the hour of lost time the man loses 10 cents and the employer 50 cents. At the Avery Company plants a safety tag is used for marking all unguarded places of equipment in need of repairs or attention. Bulletins also are mailed to the homes of the employees describing and warning against dangerous practices.

At the manufacturers' session, Thursday afternoon, Melville W. Mix, president Dodge Mfg. Company, Mishawaka, Ind., argued that on the basis of a $100,000 annual pay-roll, at a basic insurance rate of $2.50 on $100, an annual cost of $2500 for liability insurance is incurred. If, by proper inspection and protection, credits may be earned to reduce this premium to, say, $1.25 per $100, a yearly saving of $1250 is effected. This will represent 10 per cent. on an investment of $12,500, which will be a comparatively large sum for providing the necessary appliances and supervision to accomplish the result. A pair of goggles, he said, may cost $1 to $2; they may save an eye or two eyes which cannot be valued in money but which may cost in indemnity $500 to $5000, or even more. A press guard may cost $10 and save somebody $10,000 in a single possible accident. A friction clutch may cost $50 and save from 100 to 200 times its cost in facilitating quick stoppage of machinery at a critical moment.

NATIONAL COUNCIL ENCOURAGES TOTAL ABSTINENCE

At the Thursday morning session a resolution was offered and adopted placing the National Council on record in support of the prohibition of intoxicating liquors at all industrial plants and the encouragement of total abstinence on the part of all employees.

The programme included a number of other addresses bearing upon the widespreading phases of the general problem of safety. It was with greatest difficulty that the sessions of the three days were made to compass the great mass of material for which the programme provided. At the closing session the officers were re-elected for the ensuing year.

The Flaming Arc Lamp in the Steel Industry

A paper devoted to the flaming arc lamp in the steel industry and presented by Allen T. Baldwin at the recent convention of the Association of Iron and Steel Electrical Engineers at Cleveland contains information that has been collected from the various lamp manufacturers from numerous industrial establishments in the iron and steel industry and from the different departments of the National Carbon Company. Data secured from 158 manufacturing organizations throughout the industry, ranging from receiving docks to fabricating shops and foundries, including blast furnaces, rolling mills and departments of steel plants themselves, indicate that since 1909 93.1 per cent. of the plants have retained and increased their equipment of flaming arc lamps. Results are given of tests that were made of long burning, flaming arc and vacuum Mazda lamps in two similarly constructed modern factory buildings having a large window area and white finished walls, where machine work on large castings was done. Based on an annual burning period of 3300 hr., a saving of $88.88 was recorded in favor of the flaming arc lamp when the price of current was 3c. per kw.-hr. As compared with a nitrogen filled tungsten lamp, a saving of $30.52 was recorded in favor of the flaming arc lamp with current at 1c. per kw.-hr. In conclusion the author states that while no one unit can fairly be considered ideal, each has a particular field to which it seems best suited, and in this regard the long burning flaming arc lamp has been developed to the point where it meets the demands of the industry for large area illuminants.

Strength and Ductility of Malleable Iron*

How These Are Affected by the Removal of the Skin—The Core and the Skin Compared—Defects in Test Bars

BY ENRIQUE TOUCEDA

I want to contradict as emphatically as I may, the statement frequently made, that after the skin of a malleable casting has been removed, the remaining metal is of inferior quality, if not absolutely worthless. A case in point occurs in a recent article entitled "Castings for Specific Needs," written by a metallurgical engineer, and read before an engineering society of Cleveland. Abstracts from this paper were subsequently published in *The Iron Age*, May 21, 1914. His statement was as follows: "Where still additional strength is required and considerable toughness, the malleable casting offers an excellent solution, especially where castings are small. The malleable casting should not be confused in value with steel forgings, as the only part that is at all ductile is the outside skin. Malleable castings are about twice the value of gray iron castings."

It is a well-known fact that the softest and most ductile constituent in any iron product is ferrite,

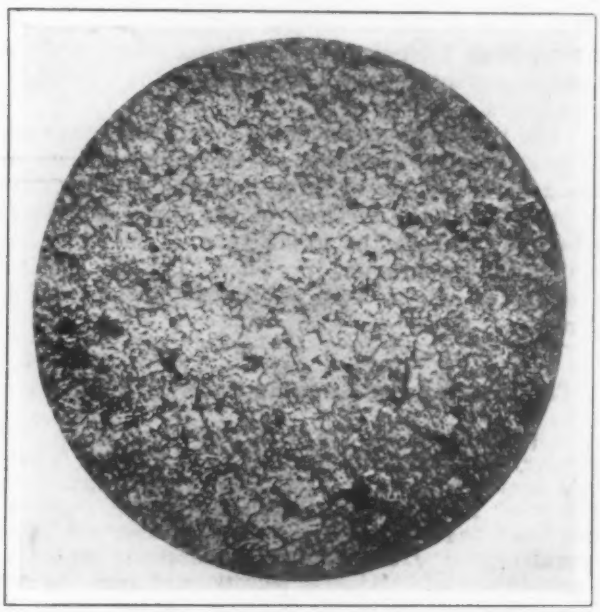


Fig. 1—Photomicrograph of the Cross Section of a Wrought Iron Bar

carbonless iron. If the structure is wholly ferrite, and this is uncontaminated by slag or free carbon, it can be predicted that the metal is of maximum softness and ductility.

The structure of good wrought iron consists practically of ferrite, due to its containing but an inappreciable amount of carbon, but the uniformity of the structure, as can be seen by reference to the photomicrograph, Fig. 1, enlarged 63 diameters, is somewhat interfered with by the presence of slag particles that cannot be entirely removed from the iron during the process of manufacture. If we obtain some other product of similar structure, aside from the fact that for the particles of slag there is substituted some other impurity equally inert, we should logically expect to have a product of similar physical qualities.

*From a paper presented at the American Foundrymen Association's convention at Chicago, September 7 to 11, 1914.

As to the structural composition of good malleable iron, the object of the annealing is to separate the hard carbide of iron into its two constituents, iron and carbon, so that the structure must consist of ferrite and free carbon, failing which, the annealing has not been properly accomplished. It may be accepted then, that the structural composition of properly annealed malleable iron is made up wholly of ferrite, but with the exception of the ferrite in the rim, all of this constituent is contaminated with more or less free carbon, the preponderating amount of ferrite containing but very little, and the lesser amount containing it in highly concentrated form, these carbon patches, as they can be appropriately called, being uniformly distributed throughout the area of the section, as can be seen by reference to Fig. 2, taken at 63 diameters.

The ferrite of the malleable iron is higher in silicon than that of the wrought iron; but authorities state that such an amount of silicon as may be found in commercial malleable iron does not render the ferrite less ductile, nor does it have an influence to render more coarse the crystallization. This then can be set aside as having no bearing on the case. The presence in the ferrite of the contaminating free carbon is in too small an amount in a great part of the ferrite to affect its true physical properties to any appreciable extent, but it must lessen its strength and ductility where it occurs in the ferrite in concentrated form, as shown in the patches referred to.

HOW THE SKIN DIFFERS FROM THE CORE

If the annealing process has been arrested at the exact moment when the last trace of free or pearlitic cementite in the casting has been broken up into ferrite and free carbon, there will be seen under magnification, around the edge of the casting a rim about 1/32 in. deep of practically carbonless iron, due to the perfect elimination of the carbon to this depth. As a matter of fact such a rim as I describe exists in any piece of rolled steel or steel casting, so that in this particular a malleable casting does not differ in this respect from rolled steel or steel castings.

If we now take a ¾-in. round test bar, and calculate the area remaining after the rim has been machined off, and then the area of the metal in the rim, it will be found that the first amounts to 0.442 of a square inch, while the latter amounts to 0.07 of a square inch; the metal in the rim being 15.8 per cent. of that in the core, as the rest of the metal is sometimes designated.

It has been pointed out that the structural composition of the rim as a rule is ferrite, uncontaminated with free carbon, and it is a well-known fact that annealed ferrite will not exceed in strength more than 50,000 lb. per sq. in. If the amount of metal in the rim is but 15.8 per cent. of that of the rest of the bar, its strength would have to be very much higher than the strength of annealed ferrite in order to bring the strength of the bar as a whole to 41,000 lb. per sq. in., the average strength of commercial malleable iron. Assuming for the sake of illustration that the metal remaining after the

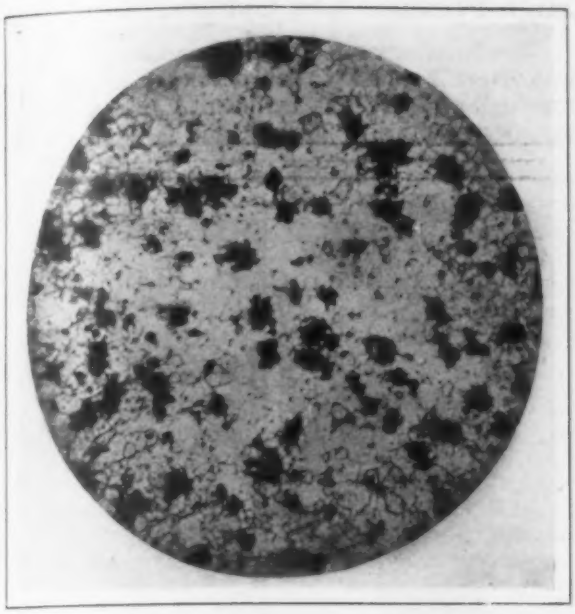


Fig. 2—Photomicrograph of the Cross Section of a Malleable Iron Bar

rim has been machined off will stand 30,000 lb. per sq. in., which is certainly far from being worthless material, the metal in the rim must stand as high as 98,838 lb. per sq. in., in order to bring the bar as a whole to a strength of 41,000 lb. per. sq. in., the average strength of commercial malleable iron. Also 98,838 lb. per sq. in. corresponds to the strength of a 0.50 per cent. carbon steel. If the statement is correct, that after the rim has been removed the remaining material is very inferior and lacks ductility, then the figure that I have placed as its strength (30,000 lb. per sq. in.) is too high, and the metal in the rim must be called upon to stand a strength in excess of 98,838 lb. per sq. in., that is, a strength equal to a 0.60 per cent. carbon steel.

An elongation of 10 per cent. in 8 in. is by no means uncommon in good malleable iron, and if the above remarks on the relative strength of the metal in the rim and core do not make the statements I am questioning absurd enough, let us dwell for a moment on the condition that must exist in a malleable test bar that yields an elongation in 8 in. of 10 per cent.

It is conceivable, and a fact that must be acknowledged, that a rim of metal having a strength in excess of that in the core, can add greatly to the final strength of the bar, but how can the metal in the rim affect the elongation, unless its ductility be less, not greater, than the metal in the core? If it be of less ductility, then it will start to check as the limits of its capacity to stretch without fracture is reached, and the metal in the core will continue to stretch until the bar breaks; but if, as is claimed, it is more ductile than the metal in the core, then the metal in the core will stretch until it can no longer do so, when the metal in the core breaks, and that in the rim likewise, for obvious reasons, though it must be admitted that the metal in the rim had not at the time reached the limits of its capacity to stretch.

If my reasoning is correct, any record of elongation on a malleable iron test bar expresses in exact terms the elongation of the metal in the core only, as the metal in the rim is capable of further stretch. Records of elongation then, on malleable iron test bars, are a direct measure of the ductility of the metal in the core of the bar. The trouble can be laid to defects in the test bars from which their data have been obtained.

DEFECTS IN TEST BARS

The writer, particularly during the past few years, has had a great deal of experience in the making of physical tests of malleable cast iron, and he has noticed that defects nearly always exist in bars such as are usually made for tensile test, due to unsoundness caused by shrinkage, or faulty contraction as the case may be. Such defects obviously are in the majority of cases located at the center of the section of the bar, and nearly always at the central region of the bar's length.

Many test bars are made with a reduced section, for the double purpose of enabling the grips of the machine to better hold the specimen, and of forcing the bar to break outside the grips. A bar cast in this manner is nearly always defective due to the inability of the iron to set normally.

Where bars are of uniform section throughout, and either round or square, defects are of frequent occurrence at the central portions of the bars. If the region around the central portion of the test bar is unsound, due to any cause, what chance is there of arriving at correct conclusions as to the relative strength of metal in skin and core? Another bad practice in the making of such experiments lies in the failure to make the surface of the bar smooth after the final cut.

If there is any reason why there should exist a great difference in strength between the metal of the skin and core, surely there should be seen some tangible evidence under the microscope. In order to go into this matter along lines that may appeal to you as being more satisfactory than a mere discussion of the situation, we have made some physical tests conducted under conditions of extreme severity as compared with the regular tensile test.

This was done first, because the greater part of malleable iron castings are subject to dynamic stresses; that is, subjected to great abuse in service; second, in the selection of a test bar where any unsoundness will be restricted to a part of the bar that will not affect the correctness of the results; and third, for a reason that will appear later.

The form of the test bar is a wedge 1 in. wide throughout and 6 in. long; ½ in. thick at the base, and tapering to 1/16 in. at the top. This wedge, when tested under a specially designed test hammer, has its thin end first bent slightly over by hitting it a few slight blows with a hand hammer for the purpose of facilitating the curling up of the bar when it is subsequently placed on the anvil of the test hammer to be struck repeated blows until fracture takes place. In testing the bar, it is held upright on the anvil, when the hammer-weight, delivering a seventy-foot pound blow, is allowed to fall on it. If the metal is ductile and strong it will curl up more and more until failure takes place, and the number of blows required to produce fracture and the amount of the curl become a direct measure of the strength and ductility of the metal.

In Fig. 3 can be seen four such test wedges that have been struck repeated blows, the blows

Fig. 3—Four Test Wedges of Malleable Iron

being stopped the moment it was seen that fracture had commenced.

A pattern was made for a wedge of the above dimensions, and another was made of the same length and width, but 5/8 in. thick at the base, and 3/16 in. at the other end. When 1/16 in. of metal is planed off of the two 1 x 6-in. faces of the latter wedge, we have one that corresponds exactly in size with the other, so that through the aid of these two patterns, and the machining of the larger as described, we can secure wedges of the same dimensions, one with the skin on and the other with 1/16 in. of the surface metal removed.

The following are the results of the tests, the weight delivering a blow of seventy-foot pounds when the wedge starts to curl, and a slightly greater force after each succeeding blow:

Unmachined wedges.	Machined wedges.
Afternoon heat of June 3	
Average of 4 tests.	Average of 4 tests.
18.5 blows.	13.2 blows.
Afternoon heat of June 4	
Average of 4 tests	Average of 4 tests.
29.75 blows.	26.3 blows.
Morning heat of June 6	
Average of 4 tests	Average of 4 tests.
19.75 blows.	21.2 blows.

Here we have one case where the machined wedges actually stood a better test than the ones with the skin on, but setting this aside as unusual, which I believe would prove to be the case, can anyone state after the physical tests herewith presented that malleable iron with absolutely all its skin removed is neither ductile nor trustworthy?

Fig. 3 shows four of these machined wedges that have stood 24, 24, 21 and 20 blows of seventy-foot pounds respectively. The heavy blow delivered by this weight is falling on very light sections that vary in size from 1/16 x 1 in. to the largest of 7/16 x 1 in., at which section they usually fail. Could any metal other than a very ductile one stand such treatment prior to failure?

We now come to the third reason for the selection of this type of bar for the test. Calculation will show that after 1/16 in. has been machined from each side of the wedge, about 20 per cent. of the stock has been removed from the base; about 66 per cent. from the thin end section, and about 26 per cent. at the section where failure usually takes place. This is testing the core of the metal with a vengeance. These wedges were cast from regular iron as made from day to day, and received no treatment other than what the regular run of commercial castings made at this plant are given. I have individual cases of machined wedges that have stood as high as 29 blows.

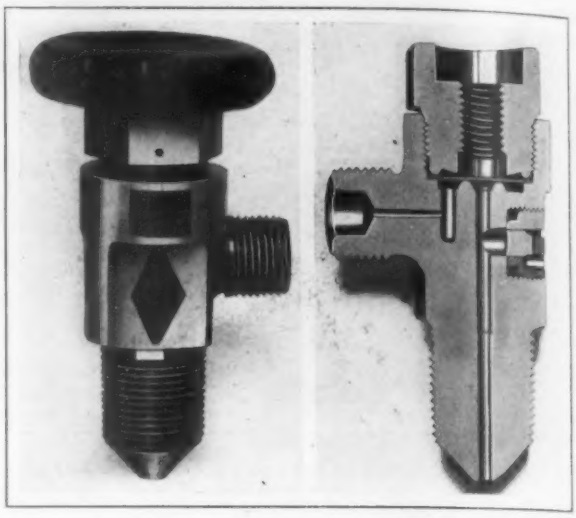
Through the courtesy of a manufacturer of steel castings I had some steel wedges cast from the same pattern as that from which the malleable iron ones were made, and these stood 19, 21 and 23 blows respectively, when tested in exactly the same manner.

Bad castings made by any process are worthless. The metallurgy of malleable iron, in my opinion, is more complex and more difficult than that of any steel or iron process. Owing to this fact particularly, the industry has suffered greatly through the sale by some of a product that has served to place doubt in the minds of many as to the true physical characteristics of these castings.

The Climax Mfg. Company, Corry, Pa., manufacturer of engines, etc., is rebuilding a part of its erecting shop, employing its own mechanics.

High-Pressure Gas Cylinder Stud Valve

The International Oxygen Company, 115 Broadway, New York City, has developed a stud valve for high-pressure gas cylinders. It can be used for pressures up to 2500 lb. and is intended more



Exterior View of a Stud Valve for Cylinders Containing Gases at High Pressures and Split to Show the Interior Construction

especially for use on cylinders containing oxygen, hydrogen, nitrogen and similar gases. Nothing but metal is used in the construction of the valve, and absolute freedom from corrosion is claimed. Large passages for the flow of the contained gas are provided, and the valve is equipped with a special safety plug that has been approved by the Bureau of Explosives of the Interstate Commerce Commission.

As will be noticed from the view at the right of the accompanying illustration, the construction of the valve is simple and all parts are readily accessible and capable of being replaced at slight expense when worn. No packing is used in any part of the valve, the body being of forged Tobin bronze, while the other parts are of metals which are not likely to be corroded by the gases with which they are used or atmospheric conditions. The elimination of packing is made possible, it is emphasized, by the use of tough and springy material for the diaphragm, thus eliminating cracking or breaking in service. The customary stuffing box is done away with as is also the use of rubber, leather or similar inflammable materials. Normally the diaphragm, which is slightly concave, is set away from the seat of the valve a distance that is sufficient to permit the valve to open all the way. The gas, therefore, does not have to raise the diaphragm and all the gas in the cylinder can be used down to atmospheric pressure.

The safety plug of the valve is filled with a fusible metal which melts at a temperature below the boiling point of water. Three passages, each in a straight line with the direct action of the gas in the cylinder, are provided to permit the metal to flow out. The plug also has a hemispherical seat and a phosphor bronze disk, the compression of the latter as the plug is screwed into the body of the valve being relied upon to form a tight seat. Protection against breakage is provided by having no portion of the plug project beyond the valve body. One of the points about the plug upon which special emphasis is laid is that while it will blow when subjected to the heat of a fire before the expansion of the gas can damage the cylinder, it will not melt when acted upon by the direct rays of the sun or any other atmospheric condition.

The Defendant's Brief in the Steel Suit

United States Steel Corporation's Attorneys Present Their Statement and Argument to the Court—Ask Dismissal of Case

In last week's issue of *The Iron Age* some extracts were given from the brief of the Government's attorneys in the suit for the dissolution of the United States Steel Corporation, in which oral arguments are being made this week in Philadelphia before the Circuit Court of Appeals, composed of Judges Buffington, McPherson and Wooley. The Government's attorneys obtained an expediting certificate so that the argument could be brought directly before the Court of Appeals instead of the District Court, which would have ordinarily been the mode of procedure. The brief of the Steel Corporation's attorneys has since been received. It is presented in two octavo volumes, one of which, entitled "Statement of the Case," comprises 560 pages, with an appendix of 10 pages, and the other, entitled "Argument," comprises 248 pages.

The larger volume presents a condensation of the pleadings in the case and of the testimony given at the various hearings before the examiner appointed by the court for that purpose. The contents are arranged logically, proceeding from the organization of the Federal Steel Company, recognized as the beginning of the mergers which resulted in the formation of the United States Steel Corporation, and takes up the various points made the subject of attack by the Government's attorneys. The smaller volume is a strictly legal document, which analyses the contentions of the Government's attorneys and enters into a discussion of the testimony presented and its bearing on the general case.

Statement of the Case

The character of the contents of the larger volume is shown by the following topics taken from the table of contents: As to the organization of the Federal Steel Company; as to the organization of the United States Steel Corporation; as to the allegation of an intent to create a monopoly by the organization of the United States Steel Corporation; as to the allegation of an intent to acquire existing monopolies; as to the alleged threat of Mr. Carnegie to build a tube works at Conneaut; as to the alleged purpose of the Carnegie Steel Company to go into hoops, wire and other finished products; as to the traffic agreement of February 4, 1901, between the Carnegie Steel Company and the Gould Syndicate; as to the extent of competition between the companies taken over by the Steel Corporation; purchase of Shelby Steel Tube Company, Union Steel Company, Troy Steel Products Company, Clairton Steel Company, Tennessee Coal, Iron & Railroad Company; the Great Northern Ore lease; as to the dismantling of plants; as to the purchase of pig iron to sustain the market; as to the accomplishment of the objects for which the Steel Corporation was formed, (1) in effecting economies in the manufacture and distribution of steel products, (2) in developing its trade generally, (3) in developing its foreign trade in particular; with respect to the extent to which the development of its foreign trade has depended upon the corporation's size and diversity of products; as to the policy pursued by the Steel Corporation in carrying on its business, (1) with respect to its employees, (2) with respect to its competitors, (3) with respect to its customers; comparison of prices between a period preceding and a period following the organization of the Steel Corporation; pools and combinations; meetings of manufacturers after dissolution of pools; Gary dinners; as to interlocking directorates; as to the allegation that the Steel Corporation has obtained a monopoly in the manufacture and sale of iron and steel products; iron ore; coal and coke; as to the power of the Steel Corporation to monopolize trade; history of subsidiaries of the Steel Corporation.

A very great deal of the matter presented under the headings above given has been published from time to time in the columns of *The Iron Age* in connection with reports of the different hearings before the examiner. It appears unnecessary therefore to make extended extracts from the condensation of the testimony given in this volume. In the shape in which it is here given, however, the voluminous testimony has been so boiled down that the court is placed in possession of the salient points brought out and is relieved from the task of wading through thousands of pages. In glancing over the abstract presented, the impression is made that those who have prepared it have done their work with fairness and intelligence. The testimony given by witnesses for the Government is not glossed over for the purpose of weakening it.

STRENGTH OF STEEL CORPORATION COMPETITORS

Interesting statements are given regarding certain of the most important competitors of the United States Steel Corporation, which are taken either from Government special exhibits or from the defendant's exhibits filed with the respective briefs. Some of the information here given has never been made public heretofore.

The Jones & Laughlin Steel Company is stated to have made 485,753 tons of finished products in 1901 and 1,490,122 tons in 1912, a growth of 206.79 per cent. Its capital is $53,579,000 in stock and bonds and its surplus "is very large, as will appear by Government Special Exhibit 15-*c*, not here printed, to avoid general disclosure."

The Cambria Steel Company in 1901 made 466,812 tons of finished products, while in 1913 it made 1,192,679 tons, a growth of 155.5 per cent. Its capital is $48,852,000 in stock and bonds and its surplus $20,520,175.84.

The Pennsylvania Steel Company and its subsidiary, the Maryland Steel Company, in 1901 made 515,091 tons of finished products and in 1911 it made 539,414 tons, an increase of 4.7 per cent. Its present capitalization is $52,112,800, and surplus $14,602,575.76.

The Bethlehem Steel Company in 1901 made 18,146 tons of finished products and in 1913 it made 703,792 tons, a growth of 3779.7 per cent. Its capital in stock and bonds is $45,800,500 and its surplus $9,714,517.08.

The Lackawanna Steel Company in 1901 made 333,040 tons of finished products and in 1911 it made 543,653 tons, an increase of 63.2 per cent. Its capital is $69,737,000 in stock and bonds and its surplus $7,514,876.71.

The Republic Iron & Steel Company in 1901 made 513,387 tons of finished products and in 1912 it made 979,617 tons, an increase of 90.8 per cent. Its capital is $67,122,595.60 in stock and bonds and its surplus $6,512,777.64.

The Inland Steel Company in 1901 made 23,000 tons of finished products and in 1913 it made 367,071 tons, an increase of 1495.9 per cent. Its capital in stock and bonds is $13,312,700 and its surplus $5,084,371.76.

The Youngstown Sheet & Tube Company began operations early in 1902; by 1913 its production of steel ingots had grown to 848,700 tons and finished products to 465,288 tons. Its capital at the start was but $600,000 and is now $22,425,400 in stock and bonds and its surplus $6,874,679.79.

The Colorado Fuel & Iron Company in 1901 made 192,080 tons of finished products and in 1912 it produced 485,743 tons, an increase of 152.8 per cent. Its capital is $76,576,500 in stock and bonds and its surplus $4,432,456.17.

The La Belle Iron Works in 1901 made 55,585 tons of finished products and in 1913 it made 313,292 tons,

an increase of 463.04. Its capital is $21,607,800 in stock and bonds and its surplus $3,245,470.33.

The Argument

In opening their argument, the attorneys for the corporation state that they do not consider the legality of the organization of the subsidiaries of the corporation open to inquiry in this case or their status or practices prior to the organization of the Steel Corporation directly in issue. They then proceed to discuss the following points:

1. The organization of the Steel Corporation and whether or not its direct and necessary effect was to restrain trade or to create a monopoly.

2. The intent with which the corporation was organized as indicated by the circumstances which led up to and surrounded its organization and the after conduct of its managers.

3. The present relation of the corporation to the iron and steel industry, as showing present monopoly or restraint of trade or a dangerous probability thereof.

4. The status of the corporation's subsidiaries and the prayer of the Government for their dissolution.

Under the first head numerous judicial decisions are cited for the purpose of determining what is meant by the terms "monopoly" and "restraint of trade" as used in the anti-trust act.

THE DIRECT EFFECT OF THE ORGANIZATION

Considering the inherent nature of the acts in contemplation when the Steel Corporation was formed, the argument states that one of the effects, of course, was to suppress such competition as had previously existed between the concerns taken over and another effect was to give to the combination control over a certain percentage of the steel industry, and both of these effects must have been within the contemplation of the parties. Discussion follows as to whether the amount of the competition suppressed was so great or the percentage of business acquired so large as of itself to constitute monopoly or restraint of trade independent of any question of intent.

Facts are set forth with regard to the Steel Corporation's proportion of the country's total production of iron and steel in 1901 and also regarding the extent of the ore deposits acquired, and the deduction is made that it can not in reason be said that the combination of manufacturing concerns whose percentage of the production did not exceed 50.1 and whose acquisition of a raw material supply did not exceed its reasonable requirements, and did not approach to a monopoly necessarily operated to restrain trade, in and of itself amounted to a monopoly or an attempt at monopolization. Authorities are cited in support of this contention. It is shown that the corporation's proportion of the total production of the country is now 45.7 per cent. of the production for all the markets of the world and 40.9 per cent. of the production for domestic supply.

The interesting statement is made that on the question of intent to monopolize it is to be noted that no attempt appears to have been made to acquire either the Jones & Laughlin, Cambria, Pennsylvania or Bethlehem steel companies. These concerns were too large and important to have been overlooked by inadvertence, and monopoly or control of the industry could hardly have been anticipated without them.

With respect to iron-ore properties, it is held that no evidence in the case warrants the conclusion that there was ever a time when other manufacturers could not secure adequate supplies of satisfactory ore from either the Lake Superior region or other available sources. The essential element in an attempt to monopolize, namely, the exclusion of others, is therefore not shown to have existed.

CARNEGIE PROPERTY OFFERED TO FEDERAL DIRECTORS

Three great controlling facts are stated to have been brought out: (1) That the Carnegie properties were offered to the Federal directors—not sought by them. (2) That Mr. Carnegie's offer was not based on a desire to enter a combination but on a desire to retire from business and devote his life and means to philanthropic purposes. (3) That the offer was accepted and complementary properties purchased because Mr. Schwab was able to inspire the Federal directors and Mr. Morgan with his vision of a great business which should embrace all lines of steel and all processes of manufacture from the ore to the finished product, and which by reason of the economies thereby effected and the diversity of products it would be able to offer could successfully compete in all the markets of the world. The vision was no idle dream as subsequent events have proved, and it is not to be wondered at that American business men were captivated by it. To picture this organization as a mere combination among owners of competing concerns is to ignore all the testimony in the case. The owners of all the subsidiaries except the Federal were treated as prospective vendors and negotiated with at arm's length.

COMPETITORS, CUSTOMERS AND EMPLOYEES

With regard to unfair methods of trading, it is held to be significant, if not indeed conclusive, that not a competitor of the Steel Corporation anywhere in any line has alleged anything against it.

As to the treatment of customers it is stated that not a customer has testified that the corporation ever refused to sell him any particular article because he bought the remainder of his requirements from its competitors or that it ever conditioned the sale of any article upon the purchase of any other.

With regard to the treatment of employees, the statement is made that it appears that the corporation has reduced wages only once in the whole period of its existence; that this was occasioned by the severe business depression of 1904 which compelled the corporation to pass the dividends on its common stock and that it restored the wages before it restored the dividends. It also appears that while the corporation did not reduce wages after the panic of 1907 other manufacturers did. It further appears that since the formation of the corporation the wages of its employees have been increased an average of 28½ per cent. The record also shows the expenditure of large sums of money for sanitation, accident prevention and other welfare work.

TREND OF PRICES DOWNWARD SINCE 1901

With regard to the effect of the formation of the corporation on the price of steel products, it is pointed out that even the charts put in evidence by the Government show a marked downward trend of steel prices since the corporation was formed. The price of its products is shown to have decreased an average of about $8 a ton since it was formed. It is also shown that the price of steel products as compared with other commodities has diminished 16.5 per cent. since the corporation was formed.

The record shows not only that the corporation has not increased its percentage of output of steel products since 1901, but that it has suffered a material decrease in substantially all lines.

The purchase in recent years of the Shelby Steel Tube Company, Union Steel Company, Troy Steel Products Company and Clairton Steel Company is the subject of considerable comment and in each case it is shown that the purchase was not made for the purpose of reducing competition.

The conditions surrounding the Great Northern Ore lease are explained and the charge is refuted that the lease was taken to prevent the Hill ores from being mined and sold to independent producers or from being utilized to build up a new and dangerous competitor in the iron and steel business.

The circumstances connected with the purchase of the Tennessee Coal, Iron & Railroad Company are entered into with much detail and the statement is made that the proofs show that the company was not a substantial competitor of the Steel Corporation, either actually or potentially, but was only made because the corporation had accounts amounting to hundreds of millions of dollars out against different people all over the country and that it decided to make the purchase in order to relieve the situation arising from the financial disturbances of 1907.

The ownership of railroads is gone into thoroughly and the action of the corporation is vigorously defended. The claim is made that in this ownership there is nothing indicative of power to monopolize or to restrain trade or threatful of such a result.

That the meetings of the manufacturers and the Gary dinners did not have the effect contended for by the Government, and that they did not suppress competition or restrain trade is conclusively shown by the testimony of more than 200 witnesses, customers and competitors.

As to interlocking directorates, the statement is made that not a single case of suppressed competition—using that term in its broadest sense—is shown to have arisen from the influences of common directors. In not a single instance has the door of opportunity been closed to any rival manufacturer by any such means.

The object of any such petition as the Government has filed in this case, says the argument, is to remove artificial barriers from the channels of trade and to restore competitive conditions, and yet this evidence shows without the slightest contradiction that no artificial barriers exist in the way of the steel trade; that for nearly ten years competitive conditions in this trade have been ideal and that under these conditions new competitors have sprung up, old competitors have grown and expanded, products have improved, prices have declined and trade has flourished as never before.

SALIENT POINTS MADE IN CONCLUSION

"The Government investigated the subsidiaries of the Steel Corporation from 1898 to the summer of 1901 and investigated the Steel Corporation itself during the latter year. The commission which conducted this examination was composed of representatives of both Houses of Congress and of the executive department specially chosen for their supposed fitness for such work. The Government again investigated these companies, particularly the Steel Corporation—this time through the Bureau of Corporations—from 1905 to 1907.

"It does not appear that either investigation disclosed any illegality in the organization of any of the companies or of the Steel Corporation, or any purpose or intent to restrain trade or to monopolize the same either at the time of such organizaton or afterward. On the contrary, the Commissioner of Corporations who conducted the 1905-7 investigation testified that his examination was as thorough and complete as it was possible to make it and that he found no violation of the anti-trust act, and so reported to the President. And Mr. Roosevelt testified that the Attorney-General advised him in November, 1907, that so far as the Department of Justice was concerned no reason existed for believing that the Steel Corporation was subject to prosecution under the anti-trust act.

"The Steel Corporation has kept the public and the Government fully informed as to its course of conduct and as to its policies ever since it was organized, and in the matter of the purchase of the Tennessee Coal, Iron & Railroad Company in particular it informed the President beforehand of its proposed action and of the reasons therefor, and only proceeded after being advised that the Government saw no reason for objecting thereto.

"Meanwhile the corporation, relying on the apparent approval of the Government and the public, has gone on spending hundreds of millions of dollars in the development of its domestic and foreign trade to the manifest advantage of its employees, its customers and the general public, and without injury to its competitors or others. And in the same faith and confidence over 150,000 persons have invested their savings in its stock, included among whom are some 50,000 of its employees.

"It is not necessary to claim that these circumstances worked an estoppel against the Government, but we do claim that they indicate a contemporaneous judgment in favor of the integrity of the organization and management of the Steel Corporation by those whose duty it was to judge, and that such judgment ought not to be overturned at this late date, after rights of so important a character have grown up in reliance thereon, without the most cogent and persuasive reasons.

"And we respectfully submit that the belated attempt of one Administration to disregard the deliberate judgment of another ought not to appeal to the conscience of a Chancellor, particularly when it is made at the expense of the investing public and the wage earners of the country.

"In Robertson v. Downing, 127 U. S., 607, 613, the Supreme Court said: 'The regulation of a department of the Government is not of course to control the construction of an act of Congress when its meaning is plain. But when there has been a long acquiescence in a regulation, and by it rights of parties for many years have been determined and adjusted, it is not to be disregarded without the most cogent and persuasive reasons.' In U. S. v. Hermanos, 209, U. S., 337, 339, the court said: 'When the meaning of a statute is doubtful great weight should be given to the construction placed upon it by the department charged with its execution.'

"The principle of these cases, we submit, applies to the case in hand. We have not here the interpretation of a statute or a departmental regulation, it is true, but we do have the interpretation of a course of conduct which it was the duty of a department of the Government to interpret and which it did interpret after a most thorough investigation; and we have also property rights which have grown up in reliance upon such interpretation and which will be imperiled or destroyed if the present claim of the Government is sustained.

"We respectfully submit that the petition should be dismissed."

Prospects of Canadian Iron Trade

TORONTO, CANADA, October 15, 1914.—In an interview with the writer, Sir Henry M. Pellatt, director of the Dominion Steel Corporation, and one of its most active officers, stated that, upon the declaration of peace in Europe, Canadian railroads would commence a general reconstruction of their lines and that new rails would be laid in many new sections of the country. In consequence of this, the iron and steel industries of Canada would receive an impetus such as they had never hitherto experienced. Until the end of the war, however, he does not look for any substantial revival in the market for steel products, for the reason that the Canadian railroads have practically shelved construction while hostilities last. He continued:

"The day that peace is declared will see the inauguration of a period of feverish reconstruction all over Europe. The damage caused by marching and fighting millions has been incalculable and, as in the past, the courage and optimism of the nations affected will be equal to the task of material restoration. Can one suppose that all this reconstruction will not make enormous demands upon Canada or will not contribute to her prosperity? It is unthinkable.

"Instead of our regarding Canada as over-burdened with transportation lines, we shall see in a year or two a general rebuilding of the present systems, and fresh construction will be the order of the day. No doubt we shall see Mackenzie & Mann utilizing the balance of their bond issue of $45,000,000 to extend railroad facilities to new areas of the Dominion.

"Industrially, the Dominion is certain to double the number of its plants within five years. I do not seek to mask the fact that our wheels have slowed down during the war and that the situation for some has been dangerous. But, looking to the future, we must build up enough industries to meet the needs of an ever-increasing agricultural population. We have no more industries than we need now. The close of the war will again let loose the stream of emigration and we shall see 300,000 or 400,000 people a year from Great Britain and Europe take their places as Canadian farmers. Their requirements in manufactured products must be met; hence the expansion of our industries."

The Trumbull Steel Company, Warren, Ohio, has opened an Eastern sales office in the Grand Central Terminal Building, New York City, in charge of Frank H. Colladay, as district sales manager. The company's products are tin and terne plates, black and galvanized sheets, formed roofing products and metal shingles.

S. DIESCHER & SONS.
Mechanical and Civil Engineers,
PITTSBURGH, PA.

ESTABLISHED 1855

THE IRON AGE

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Compensation Laws and Married Men

From the very beginning of workmen's compensation as a substitute for employers' liability the question has been raised as to the handicap the system may put on the man of family in securing and maintaining employment. All the acts that have been framed, both abroad and in this country, have provided that compensation, in case of a fatal accident, shall be determined largely by the number of those dependent upon the victim. The single man whose earnings go only to his own support is not costly. The married man's risk to the owner is much larger. The employer must pay not only to the widow but to each of the children under a given age, usually 18 years.

Therefore, it has been argued that the man without dependents is the more desirable workman because the risk of compensation is less. However, under the laws enacted previous to the New York statute, the married man has had the preference in employment. Generally speaking, he feels the obligation to his family and establishes a home, and in a very great number of cases owns his domicile. His habits of industry are better than those of the average bachelor. The decision has been in his favor; but the recently enacted New York law threatens to upset this balance.

The compensation acts of the States have become more and more rigorous since the system was first introduced in this country. The final extreme to date exists in the New York statute. In case of death no real limit is placed upon the damages which must be paid the dependents of a workman. Only the death or remarriage of a widow, the death of a father or mother, or sister or brother, in case they are dependents, or coming of the children to the age of eighteen ends the period during which a stiff compensation shall be paid. To quote the digest of the New York workmen's compensation law regarding compensation for death:

> In all cases, reasonable funeral expenses, not to exceed $100, 30 per cent. of wages to wife or dependent husband during widowhood or dependency (two years extra benefits to widow upon remarriage); with 10 per cent. additional for each child under 18, until that age is reached. If no widow or dependent widower, 15 per cent. to each child. And 15 per cent. each to dependent grandchildren, brothers and sisters under 18 and to dependent parents and grandparents, subject, however, to preference of the widow or dependent widower and children, if any, for their full benefit. Total benefits limited to 66 2/3 per cent. of wages. Excess of wages over $100 per month not to be reckoned in computing death benefits.

It will be noted that the clause provides no limit of damages in actual amount that may accrue. A young widow with several little children, if the children should live to 18 years and the widow to advanced years, would bring upon the employer of the husband and father a very serious burden. Take the case of an earner of small wages and presume that his average income is $600. He leaves a widow and three children, respectively one, three and five years of age. The widow, if she lived the wholly reasonable period of 35 years, would receive from the employer $6300, which is 30 per cent. of the annual wage. The children would receive 10 per cent. for periods of 13, 15 and 17 years, amounting to $2700. With the $100 allowed for funeral expenses the total would be $9100. If the wage-earner were receiving the full prescribed limit of $100 a month, the total for the family would be $18,200.

Under the compensation acts of the other States which have adopted the system, an absolute limit is fixed beyond which no compensation can be claimed. Under the Massachusetts act, in case of fatal injury, the dependents are given compensation for a period not exceeding 300 weeks. Under the Connecticut act compensation payable on account of death resulting from injuries shall in no case be more than $10, or less than $5, weekly, and shall not continue longer than 312 weeks. Under any one of the three acts, if the deceased employee leaves no dependents, the liability to the employer is limited to funeral expenses and perhaps to other obligations which are of small account as compared with the case of the married man.

An Incubus on Business

Interviewed by the Wall Street Journal, Sir George Paish, who reached the United States last week as adviser to the British Treasury on financial and economic subjects, says with respect to opening the London Stock Exchange: "I believe it may be opened within a reasonable time." Mr. Blackett, a high official in the British Treasury, who accompanies Sir George, added: "We don't want to commit ourselves to any definite time for reopening the London Exchange, but the moratorium will be off November 4 and the general expectation is that before that time some plan will have been arranged whereby the Exchange may be opened." As to re-

opening the New York Exchange, and possible liquidation from abroad, Sir George said: "I see no reason for heavy liquidation from abroad."

It has been purely an assumption that there would be heavy liquidation in case the New York Exchange were opened. Of course it would be dangerous to assume that there would not be, but the fact should be more fully recognized that in avoiding the possible danger, by keeping the Exchange closed, there is not simply a very serious danger invited in another direction, but actual and untold harm is being done to commerce in the United States by the withholding of banking accommodations on commercial paper. We are experiencing injuries that may easily prove worse than the greatest of the surmised dangers we are trying to avoid.

The annual report of the Erie Railroad shows that it paid 8.13 per cent. for the extension of $6,000,000 of promissory notes falling due October 1. Further, the statement has aroused surprise in some quarters that a well-established and thoroughly sound steel interest has been paying 8 per cent. for money. These two instances are indicative of the price the people of the United States are paying for keeping the New York Stock Exchange closed to escape the possible danger of a flood of foreign liquidation.

To the partial statement of foreign held stocks given in an editorial in *The Iron Age* last week an addition can be made. The summary given embraced 37 corporations, with $2,849,801,879 par value of capital stock, and 6.9 per cent. of this was reported as held abroad. Additional information now available swells the list to 51 companies, with $3,170,645,354 capital stock, of which $210,958,618, or 6.6 per cent., is reported as held abroad, so that reports from 14 additional corporations have brought down the percentage slightly. We do not know that a similar investigation as to bonds would show a smaller percentage than is shown to obtain with stocks, but we think the balance of probability is in that direction. A recent compilation indicates that the total of listed stocks and bonds on the New York Exchange is a trifle under $26,000,000,000, and applying to this a ratio as high as 7 per cent. would only indicate $1,820,000,000 held abroad. As was suggested a week ago, however, the important point is not the total amount in dollars but the proportion, for if 7 per cent. is held abroad then 93 per cent. is held at home, and those who hold the 93 per cent. should surely be able to absorb slight additional quantities.

Sir George Paish is quoted further: "Financial conditions in London are now practically normal. . . . I consider we are now ready to weather any storm. . . . There is lots of gold in the London market at the present time." Of course we recognize that his mission is to present matters in as favorable light as possible, but it would be utterly absurd to suspect so eminent an authority, so highly accredited by a great empire, of misrepresentation.

In the circumstances a heavy liquidation in the United States of foreign held securities seems improbable, but, if there were, the natural thing seems to be that the settlement should be made in merchandise and not in gold. While endeavoring to prevent the exportation of gold, we have tied up funds in the United States and have made the transaction of business here very difficult. Beyond question, the financial situation thus produced has hampered us in exporting merchandise, and thus while trying to prevent the exportation of gold we have succeeded in curtailing the exportation of merchandise, when the merchandise export movement that physical conditions call for would have gone far toward removing the very danger we have striven in a questionable manner to cope with.

It should be the desire, and indeed it is the duty, of those business men who are engaged in commerce and not in banking or speculation to make every personal effort possible that may look to the removal of the present incubus on commerce caused by the absence of financial accommodation to commercial enterprises. It is by encouraging, not discouraging, the manufacture and movement of merchandise that the present unfortunate situation is to be relieved.

British Iron and Steel Exports

Until the detailed statistics become available it will be a question whether our iron and steel exports in September were larger than in August. The statistics for August, recently published, showed a decrease of 25 per cent. from July, although the July exports were considerably smaller than the average for the preceding six months.

The British statistics for September, now at hand, show a gain in iron and steel exports of 8 per cent. over those of August. The August exports were 45 per cent. less than those in July. Inasmuch as Great Britain has always had a large export trade in pig iron to the Continent, as well as some trade in scrap, and this business has been heavily reduced, it is desirable to segregate these items, as is done in the following table:

British Iron and Steel Exports—Gross Tons

	Scrap, pig iron, ferromanganese, etc.	All other	Total
Monthly average, six months, 1914.	94,930	310,814	405,744
July	85,819	299,482	385,301
August	36,047	175,558	211,605
September	41,322	187,670	228,992

The "all other" designation in the above table covers chiefly rolled iron and steel, together with such manufactured goods as pipe and fittings, carwheels, bedsteads, etc., but not machinery. July did not make a particularly good showing as compared with the preceding six months, and this may be taken as an indication that if the war had not started at the beginning of August there might easily have been a further decrease. The showing in the "all other" products for August and September is therefore quite a favorable one. Taking July as a basis, August exports were 58 per cent. as large, and September exports were 63 per cent. as large.

Such detailed analysis as to destination as can be made indicates that British trade with India and the colonies was quite well maintained, the decreases being large elsewhere. To the Continent the exports were light, and to South America they were decidedly light.

It would not appear, therefore, as if Great Britain had thus far profited to any extent from the practical stoppage of German iron and steel

exports, and if Great Britain has not done so our own chances are not particularly good. If it is an advantage to Great Britain for imports of unfinished steel to decrease, then there has been a great gain in that respect. The British imports of blooms, billets and slabs from Germany averaged 25,721 tons a month in the first seven months of this year, decreasing to 4554 tons in August and to nothing in September; similar imports from Belgium were 8054 tons a month in the first seven months, 1607 tons in August and 283 tons in September. Imports of sheet and tin-plate bars from Germany were 29,333 tons a month in the first seven months, 4495 tons in August and nothing in September. It is interesting, perhaps distressing, to note that the British Board of Trade figures do not acknowledge the receipt of any wire-rod imports to speak of in August and September. The wire-rod imports as reported are: July, 9200 tons; August, 1903 tons; September, 150 tons. There is a similar lack of record of any important imports of wire and wire nails.

The decline in British iron and steel imports, taken as a whole, is much greater than the decline in the exports, for the monthly average of imports for the first seven months of the year is 209,040 tons, while August showed only 63,316 tons and September only 42,425 tons. To make a brief statement, British iron and steel imports in September were 20 per cent. as large as the average in the first seven months of the year, while the exports were 57 per cent. as large.

"Safety First" May Defeat Its Purpose

In manufacturing plants giving much attention to safeguarding workmen against accidents, it has been found that employees become so familiar with warning signs that the desired purpose is largely neutralized. This accords with human nature. A man sees confronting him in some dangerous location a conspicuous sign, "Safety First." It makes a strong impression on him and he at once considers the dangers that are indicated by the warning. If, however, in the routine of his daily labor he frequently passes this place, the sign is apt to become with him so commonplace that finally it might as well not exist. The impression which had been made upon his mind is practically worn away. Of course, warnings such as this are of great value under any circumstances, for while some men may forget that they exist, others, especially the newcomers, are benefited.

The suggestion has been made that more enduring, more constant results would be achieved if a series of signs was prepared; that is to say, if differently worded warnings conveying the same idea in equally vigorous and succinct form were rotated. For example, the warning "Safety First" would be replaced after a little time by the word "Danger," or perhaps "Take Warning." These particular suggestions may not be as effective as others which could be thought out. But they illustrate the idea. The employee who has got so used to the one warning as to be heedless of it would be struck by its substitute, and when he and his fellows have begun unconsciously to disregard the caution, another change could be made, and when the list is exhausted, the rotation could begin over again.

Various students of the great work of preventing accidents have spoken strongly of the need of not only establishing systems which are generally classified nowadays under the head of "Safety First," but of enforcing them, keeping them up to date in their effect upon those whom they would protect. No doubt exists that the spice of variety would have beneficial results.

Balance of Trade Again in Our Favor

The Department of Commerce reports the total value of September exports of merchandise at $156,188,790 and imports $139,204,267, showing a balance of trade in favor of this country of $16,984,523. The exports of merchandise in August had reached a value of only $110,337,545, while the imports totaled $129,399,496, making an excess of imports amounting to $19,061,951.

This is the first time since March that a balance is shown in our favor in the movement of merchandise. The improved condition of our foreign trade is caused by an increasing demand for American goods from some of the non-combatant countries of Europe and from South America. The movement of cotton is still small, but this has been offset by greatly enlarged shipments of food products.

For the nine months ended September 30 the excess of exports over imports was $57,972,916, compared with $406,037,087 in 1913 and $283,129,764 in 1912. It is expected that our exports will continue to increase, possibly at a greater rate than our imports, thus placing us in a steadily improving condition in settling international balances. To the end of September our net loss of gold this year was $117,714,832.

Engine lathes of the sizes most commonly used, automatic turning machines of various types, screw machines and some other kinds of machine tools are being absorbed in such numbers by foreign buyers as to constitute a warning to owners of machine shops in the United States. With the return of good business, plans for increased equipment may be difficult to carry out. While some machine tools will be plentiful, others may be scarce.

Designed to give inventors a show, the International Exposition of Inventions will open Saturday, December 12, and close December 19, at the New Grand Central Palace, New York. There are several associations of inventors and patentees in America, it is understood, and from these organizations will be recruited representative men of ability to organize a congress of inventors which can put on record the needs of their class and achieve publicity for injustices from which inventors suffer and have to contend with, due to faulty or inadequate legislation. Besides the proceedings of the congress there is to be a series of lectures by competent authorities affecting the interests of American inventors and patentees.

Dust collection on woodworking machines is to be discussed at an illustrated lecture, held under the auspices of the American Museum of Safety, at 29 West Thirty-ninth street, New York City, on Thursday evening, October 22, by C. T. Graham Rogers, M.D., chief medical inspector of factories, Department of Labor, New York State.

Foreign Holdings of American Securities

W. H. Osborn, Commissioner of Internal Revenue, has conceived the laudable intention of finding out for the Treasury Department the amount of American securities now held abroad, and thus ending the guesswork now indulged in by financial writers and political economists. For this purpose he has addressed inquiries to banks and private firms doing a banking business. Mr. Osborn will make public only the aggregate showing, asking for the following information:

Amount of interest coupons received directly from abroad for collection, maturing from March 5, 1914, to September 5.

Face value of bonds or other obligations upon which the interest accrued.

Amount of coupons for which the bankers made remittances abroad by drafts on foreign countries.

Amount of collections paid out to local bankers upon drafts drawn in foreign countries against collections, and presented by local parties.

Amount of dividends collected on stocks owned and held in the names of residents of foreign countries, whether aliens or non-resident Americans.

Approximate value, as of July 31, of stocks upon which dividends were paid.

Amount of dividends remitted by drafts on foreign countries.

Amount of dividends paid to local bankers on drafts drawn in foreign countries.

Amount of interest collected on bonds, stocks, or other obligations held by the bankers for residents of foreign countries.

Approximate value of stocks upon which dividends were collected.

He also asks for an expression of opinion of the probable value of American securities held in Europe at this time.

Meeting of American Manufacturers' Export Association

The American Manufacturers' Export Association will hold its fifth annual convention at Hotel Biltmore, New York City, on Thursday, October 22. Among the speakers announced are Charles E. Jennings, president of the Association; James A. Farrell, president United States Steel Corporation; Alba B. Johnson, president Baldwin Locomotive Works; H. R. Eldridge, vice-president National City Bank, New York City; Dr. Edward Ewing Pratt, chief, Bureau of Foreign and Domestic Commerce, Washington, and Dr. Jeremiah W. Jenks, New York University. Dr. Jenks is to discuss the probable effect of the present crisis abroad on the industries and foreign commerce of the United States. George H. Richards, manager of the foreign department of the Remington Typewriter Company, will speak on "The Personal Factor in Foreign Sales," and William Harris Douglas, president, Arkell & Douglas, Inc., will deal with the export question from the standpoint of commission houses.

A business session will be held in the morning, while the addresses will be presented in an afternoon meeting and at a banquet in the evening. The headquarters of the association are at 66 Broadway, New York City.

The Steel Syndicate, 20 North Market street, Chicago, is an association which will combine the sales efforts covering a variety of metal products, including the Stark Rolling Mill Company, Canton, Ohio, represented by W. J. Parker; Berger Mfg. Company, Canton, Ohio, represented by A. B. Hartman and W. S. Haldeman; Thomas M. Lothrop & Co., Angle Steel Stool Company and New Britain Machine Company, represented by Thomas M. Lothrop; Phoenix Wire Cloth Company, Detroit, and Erdle Perforating Company, represented by Fred Bauer. The association lines covered by the Steel Syndicate include sheet metal, engineering specialties, fireproof building systems, fabricated interior sheet metal trim, wire cloth, perforated metals and steel office equipment.

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New Virginia Pig-Iron Rates Confused

New freight rates from Virginia furnaces to Northern consuming centers were put in effect by various railroads October 15 in compliance with the order of the Interstate Commerce Commission. These rates show some discrepancies, as the reduced rates have been made by the railroads in the strictest accordance with the commission's ruling. The new rate to Baltimore is $2.25 per ton against the old rate of $2.45, and the new rate to Philadelphia is $2.75 against $3. The new all-rail rate to New York is $3, including lighterage, as compared with $3.95 formerly. The inclusion of lighterage is a matter of importance to Brooklyn and other localities within the lighterage limits of New York harbor. The water rate of $2.80 to steamship docks, New York, is unchanged, but it does not include the lighterage, which is about 50c. Cities on Long Island Sound have been given a flat rate of $3.25, against $3.70. The all-rail rate to Boston is $3.25, against the former rate of $3.75. The water rate from Norfolk is $3.05, against $3.17½. The all-rail rate to Boston has not yet been made applicable to all points in that vicinity, but the commission has ordered that by November 10 the new reduced rates shall apply to all the common points which have been taking the Boston, New York, Philadelphia and Baltimore rates.

Samuel Insull, president Commonwealth Edison Company, Chicago, has founded for the Franklin Institute, Philadelphia, the Franklin medal, to be awarded from time to time in recognition of distinguished achievements in science and technology. The medal was designed by Dr. R. Tait McKenzie, University of Pennsylvania.

The Iron and Metal Markets

FEWER FOREIGN ORDERS

Fifty Per Cent. Mill Operations

Large Ferromanganese Shipments From England —Activity in Machine Tool Trade

With mill operations averaging 50 per cent. or less, and with no tangible evidence that a better scale of buying is near at hand, sentiment in the steel trade is not improved. The belief that October would show the low point both in operations and new buying was expressed in high quarters as the month came in, but it is now only a hope. The small buying waves of January-February and June-July seemed to indicate that the late fall would bring another, but the war has upset all such calculations.

Several blast furnaces in the Central West have blown out in October, while others are scheduled to stop and it is reported from Pittsburgh that a large steel plant in that district will close down before the end of the month. It is true that in some lines the amount of business booked has not shown a progressive falling off in October, but shipments on contracts have been for some time so much in excess of new orders that a still lower rate of operations is in prospect.

In contrast with the monotonous reiteration of depressed conditions in iron and steel are the reports from the machine tool trade. There the war has brought a large business from foreign governments and from manufacturers at home who needed new equipment to get out foreign war orders on time. Accumulated stocks of tools have been taken in this movement, and makers have felt warranted in a number of cases in increasing working forces which in August and September were down to the smallest in months.

Thus far the foundry trade has felt only a slight effect from the improvement in machine tools, as activity in the latter industry would compensate in but small degree for the slack demand for railroad and agricultural castings.

Prices for foundry iron are lower even without the strain of any considerable inquiry, $12.75 being currently done on No. 2 foundry iron at Ohio furnaces, while at Buffalo $12.25 is reported. Very little consideration has been given to buying for 1915 delivery. Indications are that a good deal of iron bought for 1914 delivery will not be melted before February.

Light is thrown on the ferromanganese situation by British export statistics, which show 13,000 tons shipped to the United States in September, or considerably more than the average of importations from all countries in 1913. Great Britain imported 50,000 tons of manganese ores last month, against 37,000 tons in September, 1913. The embargo laid by the Indian government on manganese ore shipments to the United States means that British producers of ferromanganese will have their needs fully supplied from India, while the closing of the Dardanelles cuts off shipments from the Caucasus.

Less is heard of foreign orders for American steel products. A New York export house has put through an order for 5000 tons of barb wire for Russia, in addition to previously reported business for France and Russia. It does not appear that British sheet mills have placed the expected sheet bar orders in this country. British steel mills are now quoting 100 shillings for sheet bars delivered in Swansea Valley.

Prices of plates and shapes which recently receded from 1.20c. to 1.15c., Pittsburgh, are not firm at that figure, and reports of 1.10c. are more common in the Chicago district. Plate mills have suffered from the paralysis of railroad buying in an almost unparalleled way.

Some fall railroad work, which was apparently imperative, has brought out several small orders for rails and track fastenings at Chicago. The Minneapolis & St. Louis placed 1500 tons of rails and the C., H. & D. and the Toledo, Peoria & Western 1000 tons each. Chicago has an inquiry for 2000 tons of tie plates. For 1000 box cars for the Nashville, Chattanooga & St. Louis, divided between two car builders, 2700 tons of steel has already been placed at Chicago.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous.

	Oct. 21, 1914.	Oct. 14, 1914.	Sept. 23, 1914.	Oct. 22, 1913.
Pig Iron, Per Gross Ton:				
No. 2 X, Philadelphia....	*$14.50*	$14.75	$14.75	$16.00
No. 2, Valley furnace....	*12.75*	13.00	13.00	13.75
No. 2 Southern, Cin'ti...	12.90	12.90	13.25	14.50
No. 2, Birmingham, Ala.	10.00	10.00	10.00	11.25
No. 2, furnace, Chicago*	13.00	13.00	13.00	15.00
Basic, del'd, eastern Pa.	14.00	14.00	14.00	15.25
Basic, Valley furnace....	*12.75*	13.00	13.00	13.75
Bessemer, Pittsburgh....	14.90	14.90	14.90	16.65
Malleable Bess., Ch'go*..	13.00	13.00	13.25	15.50
Gray forge, Pittsburgh..	*13.40*	13.65	13.65	14.30
L. S. charcoal, Chicago..	15.75	15.75	15.75	15.25
Billets, etc., Per Gross Ton:				
Bess. billets, Pittsburgh..	20.00	20.00	21.00	23.00
O.-h. billets, Pittsburgh..	20.00	20.00	21.00	23.00
O.-h. sheet bars, P'gh....	20.50	20.50	22.00	23.50
Forging billets, base, P'gh.	25.00	25.00	26.00	27.00
O.-h. billets, Phila.....	*22.40*	22.90	23.40	24.00
Wire rods, Pittsburgh...	26.00	26.00	26.00	26.50
Old Material, Per Gross Ton:				
Iron rails, Chicago.....	*11.00*	11.25	12.00	14.00
Iron rails, Philadelphia...	*13.00*	14.00	14.00	17.50
Carwheels, Chicago.....	*10.50*	10.75	10.75	12.00
Carwheels, Philadelphia..	*9.50*	10.50	11.00	12.00
Heavy steel scrap, P'gh.	*10.75*	11.00	11.00	11.75
Heavy steel scrap, Phila..	*9.50*	10.00	10.50	11.00
Heavy steel scrap, Ch'go.	8.50	8.50	9.00	10.00
No. 1 cast, Pittsburgh...	11.50	11.50	11.50	12.50
No. 1 cast, Philadelphia.	*11.00*	11.50	12.00	13.50
No. 1 cast, Ch'go (net ton)	9.00	9.00	9.00	10.25
Finished Iron and Steel, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill	1.25	1.25	1.25	1.25
Iron bars, Philadelphia...	1.12	1.12	1.12	1.32½
Iron bars, Pittsburgh....	1.15	1.15	1.15	1.35
Iron bars, Chicago.....	1.00	1.00	1.05	1.25
Steel bars, Pittsburgh....	1.15	1.15	1.20	1.40
Steel bars, New York....	1.31	1.31	1.36	1.56
Tank plates, Pittsburgh.	1.15	1.15	1.20	1.35
Tank plates, New York..	1.31	1.31	1.36	1.51
Beams, etc., Pittsburgh..	1.15	1.15	1.20	1.35
Beams, etc., New York..	1.31	1.31	1.36	1.51
Skelp, grooved steel, P'gh	1.15	1.15	1.20	1.35
Skelp, sheared steel, P'gh	1.20	1.20	1.25	1.45
Steel hoops, Pittsburgh..	1.25	1.25	1.30	1.60
Sheets, Nails and Wire, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh.	1.95	1.95	1.95	2.05
Galv. sheets, No. 28, P'gh.	2.95	2.95	2.95	3.10
Wire nails, Pittsburgh...	1.60	1.60	1.60	1.60
Cut nails, Pittsburgh....	1.60	1.60	1.60	1.55
Fence wire, base, P'gh...	1.40	1.40	1.40	1.40
Barb wire, galv., P'gh...	2.00	2.00	2.00	2.00

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Coke, Connellsville,

Per Net Ton at Oven:	Oct. 21, 1914.	Oct. 14, 1914.	Sept. 23, 1914.	Oct. 22, 1913.
Furnace coke, prompt...	$1.60	$1.60	$1.60	$2.00
Furnace coke, future....	1.75	1.75	1.75	2.10
Foundry coke, prompt...	2.00	2.00	2.00	2.75
Foundry coke, future....	2.15	2.15	2.15	3.00

Metals.

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York..	*11.50*	12.00	12.50	17.00
Electrolytic copper, N. Y.	*11.25*	11.37½	11.87½	16.75
Spelter, St. Louis.....	**4.85**	4.65	5.20	5.20
Spelter, New York.....	**5.00**	4.80	5.35	5.35
Lead, St. Louis.....	3.35	3.35	3.67½	4.20
Lead, New York.....	3.50	3.50	3.85	4.35
Tin, New York.....	*29.00*	29.75	31.60	40.35
Antimony, Hallett's, N. Y.	**13.00**	12.00	10.00	7.12½
Tin plate, 100-lb. box, P'gh	$3.25	$3.25	$3.30	$3.50

Finished Iron and Steel f. o. b. Pittsburgh

Freight rates from Pittsburgh, in carloads, per 100 lb.: New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Louis, 22½c.; Kansas City, 42½c.; Omaha, 42½c.; St. Paul, 32c.; Denver, 84½c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 80c. on plates, structural shapes and sheets No. 11 and heavier; 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter; 65c. on wrought pipe and boiler tubes. The foregoing rates to the Pacific coast are by rail. The rate via New York and the Panama Canal on plates, shapes, etc., is 46c.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.15c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers with extras:

Rectangular plates, tank steel or conforming to manufacturer's standard specifications for structural steel dated February 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼-in. thick on edge, or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of 3-16 in. take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras	Cents per lb.
Gauges under ¼ in. to and including 3-16 in....	.10
Gauges under 3-16 in. to and including No. 8....	.15
Gauges under No. 8 to and including No. 9....	.25
Gauges under No. 9 to and including No. 10...	.30
Gauges under No. 10 to and including No. 12...	.40
Sketches (including straight taper plates), 3 ft. and over	.10
Complete circles 3 ft. in diameter and over.....	.20
Boiler and flange steel.....	.10
"A. B. M. A." and ordinary firebox steel.....	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Widths over 100 in. up to 110 in., inclusive.....	.05
Widths over 110 in. up to 115 in., inclusive.....	.10
Widths over 115 in. up to 120 in., inclusive.....	.15
Widths over 120 in. up to 125 in., inclusive.....	.25
Widths over 125 in. up to 130 in., inclusive.....	.50
Widths over 130 in.....	1.00
Cutting to lengths, under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.....	1.55

No charge for cutting rectangular plates to lengths 3 ft. and over.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees, 3 in. and over, 1.15c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.....	.10
H-beams over 18 in.....	.10
Angles over 6 in., on one or both legs.....	.10
Angles, 3 in. on one or both legs, less than ¼ in. thick, as per steel bar card, Sept. 1, 1909.....	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail).....	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909.....	.20 to .80
Deck beams and bulb angles.....	.30
Hand rail tees	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.....	1.55

No charge for cutting to lengths 3 ft. and over.

Wire Products.—Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent. discount in 10 days, carload lots to jobbers, annealed, $1.40; galvanized, $1.80. Galvanized barb wire and fence staples to jobbers, $2; painted, $1.60. Wire nails to jobbers, $1.60. Woven wire fencing, 73 per cent. off list for carloads; 72 off for 1000-rod lots; 71 off for less than 1000-rod lots.

The following table gives the price to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	0 to 9	10	11	12&12½	13	14	15	16
Annealed	$1.55	$1.60	$1.65	$1.70	$1.80	$1.90	$2.00	$2.10
Galvanized ...	2.00	2.00	2.05	2.10	2.20	2.30	2.70	2.80

Wire Rods.—Bessemer, open-hearth and chain rods, $26 to $26.50.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on steel pipe in effect from April 20, 1914, and iron pipe from June 2, 1913, all full weight:

Butt Weld

Steel Inches	Black	Galv.	Iron Inches	Black	Galv.
⅛, ¼ and ⅜....	73	52½	⅛ and ¼.....	66	47
½	77	66½	⅜	65	46
⅝ to 3.....	80	71½	½	69	56
			¾ to 2½	72	61

Lap Weld

2	77	68½	1¼	56	45
2½ to 6.....	79	70½	1½	67	56
7 to 12	76	65½	2	68	58
13 to 15	53	..	2½ to 4.....	70	61
			4½ to 6.....	70	61
			7 to 12	68	55

Reamed and Drifted

1 to 3, butt	78	69½	1 to 1½, butt...	70	59
2, lap	75	66½	2, butt	70	59
2½ to 6, lap....	77	68½	1¼, lap	54	43
			1½, lap	65	54
			2, lap	66	56
			2½ to 4, lap....	68	59

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜....	68	57½	⅜	63	52
½	73	66½	½	67	60
¾ to 1½	77	70½	¾ to 1½.....	71	62
2 to 3	78	71½	2 and 2½.....	72	63

Lap Weld, extra strong, plain ends

2	74	65½	1½	65	59
2½ to 4.....	76	67½	2	66	58
4½ to 6.....	75	66½	2½ to 4.....	70	61
7 to 8	68	57½	4½ to 6.....	69	60
9 to 12.....	63	52½	7 to 8	62	52
			9 to 12	58	47

Butt Weld, double extra strong, plain ends

½	63	56½	½	57	49
¾ to 1½.....	66	59½	¾ to 1½	60	52
2 to 2½	68	61½	2 and 2½	62	54

Lap Weld, double extra strong, plain ends

2	64	57½	2	55	49
2½ to 4.....	66	59½	2½ to 4.....	60	54
4½ to 6.....	65	58½	4½ to 6.....	59	53
7 to 8	58	47½	7 to 8.....	52	42

To the large jobbing trade an additional 5 and 2½ per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts to jobbers, in carloads, in effect from May 1, 1914, on steel and from January 2, 1914, on iron, are as follows:

Lap Welded Steel		*Standard Charcoal Iron*	
1¾ and 2 in.....	62	1½ in.	45
2¼ in.	59	1¾ and 2 in.....	49
2½ and 2¾ in.....	65	2¼ in.	45
3 and 3¼ in.....	70	2½ to 2¾ in.....	54
3½ and 4½ in.....	72	3 and 3¼ in.....	57
5 and 6 in.....	65	3½ and 4½ in.....	60
7 to 13 in.....	62	5 and 6 in.....	49

Locomotive and steamship special charcoal grades bring higher prices.

2½ in. and smaller, over 18 ft., 10 per cent. net extra.

2¾ in. and larger, over 22 ft., 10 per cent. net extra.

Less than carloads will be sold at the delivered discounts for carloads, lowered by two points for lengths 22 ft. and under to destinations east of the Mississippi River; lengths over 22 ft., and all shipments going west of the Mississippi River must be sold f.o.b. mill at Pittsburgh basing discount, lowered by two points. On standard charcoal iron tubes for desirable orders the above discounts are shaded an extra 5, and occasionally two 5's by some makers.

Sheets.—Makers' prices for mill shipment on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms 30 days net, or 2 per cent. cash discount in 10 days from date of invoice:

Blue Annealed Sheets

	Cents per lb.
Nos. 2 to 8.....	1.40 to 1.45
Nos. 9 to 10.....	1.45 to 1.50
Nos. 11 and 12.....	1.50 to 1.55
Nos. 13 and 14.....	1.60 to 1.65
Nos. 15 and 16.....	1.70 to 1.75

Box Annealed Sheets, Cold Rolled

	Cents per lb.
Nos. 10 and 11	1.60 to 1.65
No. 12	1.60 to 1.65
Nos. 13 and 14	1.65 to 1.70
Nos. 15 and 16	1.70 to 1.75
Nos. 17 to 21	1.75 to 1.80
Nos. 22 and 24	1.80 to 1.85
Nos. 25 and 26	1.85 to 1.90
No. 27	1.90 to 1.95
No. 28	1.95 to 2.00
No. 29	2.00 to 2.05
No. 30	2.10 to 2.15

Galvanized Sheets of Black Sheet Gauge

	Cents per lb.
Nos. 10 and 11	1.95 to 2.00
No. 12	2.05 to 2.10
Nos. 13 and 14	2.05 to 2.10
Nos. 15 and 16	2.20 to 2.25
Nos. 17 to 21	2.35 to 2.40
Nos. 22 and 24	2.50 to 2.55
Nos. 25 and 26	2.65 to 2.70
No. 27	2.80 to 2.85
No. 28	2.95 to 3.00
No. 29	3.10 to 3.15
No. 30	3.25 to 3.30

Pittsburgh

PITTSBURGH, PA., October 20, 1914.

The steel trade is simply marking time, with no prospect of early improvement. Operations of the steel works are on a basis of 50 per cent. or less, and the opinion prevails that this rate of production may be further decreased. Blast furnaces in the Central West are blowing out because of lack of demand for pig iron. It is reported that one large steel plant in the Pittsburgh district will close down indefinitely between now and November 1, having figured that it can keep idle at a less cost than running only partly and selling its product at the low prices ruling. Foreign inquiry for barb wire and other products is showing a falling off. Absolutely nothing that is encouraging can be said about the steel trade this week, and the fear is expressed that the worst has not yet been passed. The present depressed conditions are without parallel in the experience of some of our oldest steel manufacturers. Prices on finished iron and steel are fairly steady, but on pig iron are weak, some grades being lower.

Pig Iron.—A break has come in the price of basic iron, which has been held at about $13 for four months or more. Some small sales, aggregating about 1000 tons, have been made at $12.75, Valley furnace, and it is even stated that this price has been shaded. Prices on Bessemer iron are weak, $14 having been shaded on a sale of 300 tons made to an Eastern steel company. Small lots of No. 2 foundry iron have sold at $12.75, Valley furnace. Gray forge iron is also lower, and there is no demand for it. We quote Bessemer at $14; basic, $12.75; malleable Bessemer, $12.75 to $13; No. 2 foundry, $12.75 to $13; gray forge, $12.50, all at Valley furnace, with a freight rate of 90c. a ton for delivery in the Cleveland or Pittsburgh districts.

Billets and Sheet Bars.—The steel business is neglected, there being no new demand. Operations among the sheet and tin-plate mills are quieting down still more, and this is reflected in a decrease in the volume of specifications for sheet bars. We quote Bessemer and open-hearth billets at $20 and Bessemer and open-hearth sheet bars $20.50, f.o.b. Pittsburgh; Bessemer and open-hearth billets $19.50 to $20, and Bessemer and open-hearth sheet bars $20 to $20.50, f.o.b. Youngstown. Forging billets are quoted at $25 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 to 0.60 carbon take $1 per ton extra. We quote axle billets at $23 to $24, f.o.b. Pittsburgh, depending on the order.

Ferroalloys.—The nominal price of 80 per cent. English ferromanganese is $68, seaboard, but no sales are reported at this figure. Brokers who have stocks they can draw from are offering it for prompt delivery at $65 or less, seaboard, and we note sales of two cars, or about 60 tons, at that price. It is believed there will be another reduction in the price of English ferromanganese in the very near future. We quote 50 per cent. ferrosilicon, in lots up to 100 tons, at $73; over 100 tons to 600 tons, $72; over 600 tons, $71, delivered in the Pittsburgh district. On 10 per cent. ferrosilicon the quotation is $19; 11 per cent., $20; and 12 per cent., $21, f.o.b. cars, Jackson County, Ohio, or Ashland, Ky., furnace. We quote 20 per cent. spiegeleisen, at $25 at furnace. We quote ferrotitanium at 8c. per lb. in carloads; 10c. in 2000-lb. lots and over, and 12½c. in less than 2000-lb. lots.

Steel Rails.—The market on both standard sections and light rails is very dull. A few small orders for standard sections, ranging from 100 to 500 tons, are being placed for prompt delivery, and the demand for light rails is quieter now than at any time this year. We quote standard section rails, made of Bessemer stock, at 1.25c., and of open-hearth, 1.34c., at maker's mill. There are no standard prices on light rails, these depending entirely on the size of the order and the deliveries wanted.

Structural Material.—This trade is still very quiet, with nothing in sight to indicate early betterment. The McClintic-Marshall Company has taken about 600 tons of bridge work for the Queen & Crescent Railroad. Bids go in November 3 for the Schenley high school in this city, about 1300 tons, and an apartment building on the North Side, to be erected by the Library Place Apartment Company, calling for 500 tons, is in the market. The Carnegie Steel Company has taken 475 tons of steel piling for a pumping station at Cleveland and 450 tons of sheet piling for sewer construction work at Atlantic City, N. J., also the plain material, about 1100 tons, for the State building at Chicago. We quote beams and channels up to 15-in. at 1.15c. to 1.20c., f.o.b. Pittsburgh.

Plates.—New business in plates seems to be growing steadily less, and no large projects are in sight or are being figured on that will require any large tonnage in the near future. Most of the mills are not running to more than 50 per cent. and some are running about one week in three, or less. We continue to quote ¼-in. and heavier plates at 1.15c., but the market is very weak at this price, and on anything like a desirable order 1.10c. would be named.

Skelp.—Foreign inquiry for skelp has quieted down and the domestic demand is very dull. The pipe mills are not running to more than 35 to 40 per cent. of capacity, and practically none of them is buying skelp in the open market. Prices quoted on foreign orders are about the same as on domestic. We quote: Grooved steel skelp, 1.15c.; sheared steel skelp, 1.20c.; grooved iron skelp, 1.50c., and sheared iron skelp, 1.60c., delivered to consumers' mills in the Pittsburgh district.

Wire Rods.—Mills report that foreign inquiry for rods has subsided and no large lots are under negotiation at present. The domestic demand is dull, as consumers are covered by contracts placed some time ago against which specifications are only fair. We quote Bessemer, open-hearth and chain rods, at $26, f.o.b. Pittsburgh, for foreign or domestic business, but if an attractive order came out this price would be shaded.

Iron and Steel Bars.—The new demand for steel bars is better than for iron bars, which are very dull. Specifications against contracts are coming in at a fair rate, but none of the steel-bar mills is running to more than 50 per cent. This is the season when agricultural implement makers should be specifying freely, but so far the amount of business being received from these concerns is light. We quote steel bars at 1.15c. for delivery over remainder of the year, and 1.20c. to 1.25c. for first quarter of 1915. We quote common iron bars at 1.15c. to 1.20c., Pittsburgh.

Sheets.—The foreign inquiry for sheets is less, but some shipments are still being made abroad. A fairly large tonnage of sheets has been shipped recently to Australia and Argentina. In spite of the small amount of new business being placed, prices on sheets are fairly firm. Some mills are adhering closely to 2c. for No. 28 black sheets, and 3c. for No. 28 galvanized. The general market on No. 28 Bessemer black sheets is 1.95c. to 2c.; No. 28 galvanized, 2.95c. to 3c.; Nos. 9 and 10 blue annealed sheets, about 1.45c. Operations among the sheet mills are on about a 60 to 70 per cent. basis, with some mills running at a less rate.

Tin Plate.—The report that a prominent Chicago meat packer had placed an order for 6000 boxes of tin plate at $3.10, f.o.b. makers' mill, is untrue. The concern in question has bought tin plate within the last three or four weeks and paid as high as $3.40 per box for it. The tin-plate makers have been favored with a larger amount of new business than is usually placed at this season on account of the European war and consequently heavier meat pack. The works of the American Sheet & Tin Plate Company at Elwood, Ind., containing 28 hot mills, and the company's LaBelle works at Wheeling, W. Va., containing 10 hot mills have been closed. While operations to-day are on a 70 to 75 per cent. basis it is probable this rate will be decreased shortly, as the tin-plate business will be pretty well cleaned up within the next two or three weeks. We quote 100-lb. 14 x 20 coke plates at $3.25 to $3.40 per box, but on a very desirable order it is probable that $3.25 would be shaded; in fact one mill quoted less than this price on a recent order and lost it. We quote 100-lb. 14 x 20 terne plates at $3.20 to $3.30 per box, f.o.b. Pittsburgh, but no new business is coming out.

Wire Products.—Mills report continued inquiry for barb and plain wire and wire nails for shipment to England, Russia, South America and Australia, but it has not been as heavy in the past week as before. Fairly large shipments of barb wire are being made by local mills to foreign countries, and this has helped out the situation very materially. Several local concerns making barb wire state they are pretty well filled up with orders for the next three or four weeks. The domestic demand for wire nails and wire is dull; in fact there is practically no new buying. Specifications against contracts placed some time ago are fair, and shipments of wire products by the mills at present are nearly as heavy as usual at this season in spite of the generally depressed conditions. On new orders we quote wire nails at $1.60; plain annealed wire, $1.40; galvanized barb wire and fence staples, $2; painted barb wire, $1.60, all f.o.b. Pittsburgh, freight added to point of delivery, terms 30 days net, less 2 per cent. off for cash in 10 days. We quote steel cut nails at $1.60 to $1.65, f.o.b. Pittsburgh, in carload lots. We quote woven wire fencing at 73 per cent. off in carload lots, 72 on 1000-rod lots, and 71 on smaller lots, all f.o.b. Pittsubrgh.

Shafting.—Makers report the new demand for shafting as very dull, but specifications from the automobile builders are coming in quite freely. This is the season when the implement makers should start to specify on their contracts for shafting, but so far but little business of this character has been received. We quote cold-rolled shafting at 66 per cent. off in carloads, but if any new business of moment was coming out, 67 per cent. could easily be done.

Hoops and Bands.—Little new business is being placed, as consumers are covered, and specifications against contracts are only fair. Makers report that the Pacific coast is taking a larger amount of hoops than other sections. We quote steel bands at 1.15c. to 1.20c., with extras as per the steel bar card and steel hoops at 1.25c. to 1.30c., f.o.b. Pittsburgh.

Railroad Spikes.—Two of the local spike mills are idle this week because of lack of orders. Railroads are not specifying against contracts placed early in the year, and it is probable that some tonnage will go over into 1915 that should have been shipped out this year. We quote standard sizes of railroad and boat spikes at $1.40 and small railroad and boat spikes at $1.50 per 100 lb. in carload lots, f.o.b. Pittsburgh.

Nuts, Bolts and Rivets.—There is a fair amount of foreign inquiry, and shipments of nuts, bolts and rivets are being made abroad by American makers, but not to a much larger extent than before the war started. The domestic demand is for small lots only, and makers report that specifications against contracts placed last June and July for delivery over remainder of the year are slow. Stocks of nuts and bolts held by several makers are reported heavy, and they are naming low prices in order to move them. We quote structural rivets at 1.45c. to 1.50c., and boiler rivets at 1.55c. to 1.60c. in large lots, but there is very little new demand. Discounts on nuts and bolts are as follows in lots of 300 lb. or over, delivered within a 20c. freight radius of maker's works:

Coach and lag screws	80 and 5% off
Small carriage bolts, cut threads	80% off
Small carriage bolts, rolled threads	80 and 5% off
Large carriage bolts	75 and 5% off
Small machine bolts, cut threads	80 and 5% off
Small machine bolts, rolled threads	80 and 10% off
Large machine bolts	75 and 10% off
Machine bolts, c.p.c. & t nuts, small	80% off
Machine bolts, c.p.c. & t nuts, large	75 and 5% off
Square h.p. nuts, blank and tapped	$6.30 off list
Hexagon nuts	$7.20 off list
C.P.C. and r sq. nuts, blank and tapped	$6.00 off list
Hexagon nuts, ⅝ in. and larger	$7.20 off list
Hexagon nuts, smaller than ½ in.	$7.80 off list
C.P. plain square nuts	$5.50 off list
C.P. plain hexagon nuts	$5.90 off list
Semi-fin. hex. nuts, ½ in. or under	85, 10 & 10% off
Semi-fin. hex. nuts, ⅝ in. and larger	85 & 5% off
Rivets, 7/16 x 6½, smaller & shorter	80, 10 & 5% off
Rivets, tin plated, packages	80, 10 and 5% off
Rivets, metallic tinned, packages	80, 10 and 5% off
Standard cap screws	70, 10 and 10% off
Standard set-screws	75, 10 and 10% off

Merchant Steel.—The new demand is very dull. Mills report specifications quiet. Shipments so far this month have been less than in the same period in September. Prices are largely nominal, and on small lots for prompt shipment are about as follows: Iron finished tire, ½ x 1½ in. and larger, 1.30c., base; under ½ x 1½ in., 1.45c.; planished tire, 1.50c.; channel tire, ¾ to ⅞ and 1 in., 1.80c. to 1.90c.; 1⅛ in. and larger, 1.90c.; toe calk, 1.90c. to 2c., base; flat sleigh shoe, 1.65c.; concave and convex, 1.70c.; cutter shoe, tapered or bent, 2.20c. to 2.30c.; spring steel, 1.90c. to 2c.; machinery steel, smooth finish, 1.70c. We quote cold-rolled strip steel as follows: Base rates for 1 in. and 1½ in. and wider, under 0.20 carbon, and No. 10 and heavier, hard temper, 3.25c.; soft, 3.50c.; coils, hard, 3.15c.; soft, 3.40c.; freight allowed. The usual differentials apply for lighter sizes.

Standard Pipe.—The National Tube Company, Pittsburgh, has notified its general sales agents all over the country that, effective November 1, the extreme discount to largest buyers on ⅛ to 12-in. extra strong and double extra strong pipe will be 5 per cent. instead of 5 and 2½ per cent., as now. Some of the pipe mills interpret this to mean that probably a new card of discounts on standard pipe will be issued, but nothing official on this has been given out. The new demand for merchant pipe so far this month is about the same as in September, but business in casing and other oil well supplies is slightly better. One leading mill reports that its actual orders for tubular goods booked up to October 20 show an increase of about 15 per cent. over last month. Discounts on both iron and steel pipe are being firmly held.

Boiler Tubes.—There is practically no new demand for locomotive tubes, and merchant tubes are also very dull. Prices are more or less shaded, depending on the order.

Coke.—The local coke market is flat, there being no new inquiry for either blast furnace or foundry coke. It is possible that before this month is out one or two blast-furnace companies may buy coke for November shipment, but with two or three more furnaces in the valleys going out there will be less coke used next month. The nominal price of standard blast-furnace coke for prompt shipment is $1.60 per net ton at oven, but if any coke had to be moved a lower price would be made. Standard 72-hr. foundry coke for prompt shipment is about $2, and on contracts about $2.25, but no orders for forward delivery are being placed. Some high sulphur blast-furnace coke has been sold at $1.50 per net ton at oven, or lower, and some grades of foundry coke have been sold as low as $1.75 per net ton at oven. The Connellsville Courier reports the output of coke in the upper and lower Connellsville regions for the week ended October 10 as 246,110 tons, a decrease over the previous week of 3042 tons. The output of coke now is at a less rate than at any time this year.

Old Material.—On account of dull demand and some accumulations of heavy steel scrap, prices have gone off about 25c. a ton, and it is now being offered as low as $10.75, delivered, but without finding buyers. Consumers of scrap are operating their steel works to 50 per cent. or less, and the consumption is lighter than it has

been in a long time. For delivery to consumers' mills in the Pittsburgh and other consuming districts that take Pittsburgh freights dealers quote about as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh delivery	$10.75 to $11.00
Compressed side and end sheet scrap	9.50 to 9.75
No. 1 foundry cast	11.50 to 11.75
No. 2 foundry cast	10.25 to 10.50
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district	8.25 to 8.50
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	12.00 to 12.25
No. 1 railroad malleable stock	10.25 to 10.50
Railroad grate bars	9.50 to 9.75
Low phosphorus melting stock	13.50 to 13.75
Iron car axles	19.00 to 19.50
Steel car axles	13.50 to 14.00
Locomotive axles, steel	20.00 to 20.50
No. 1 busheling scrap	9.50 to 9.75
No. 2 busheling scrap	6.50 to 6.75
Machine shop turnings	7.75 to 8.00
Old carwheels	11.25 to 11.50
Cast-iron borings	8.35 to 8.50
†Sheet bar crop ends	11.00 to 11.25
Old iron rails	13.00 to 13.25
No. 1 railroad wrought scrap	11.00 to 11.25
Heavy steel axle turnings	8.25 to 8.50
Heavy breakable cast scrap	10.75 to 11.00

†Shipping point.

Philadelphia

PHILADELPHIA, PA., October 20, 1914.

The slight change in the market is not for the better, inasmuch as demand is lighter in several directions and prices are softer all along the line. In some cases quotations have been shaded, but not openly. For plates, shapes and bars 1.30c., Philadelphia, is generally named as the minimum, but it is reasonably certain that business has been done in the first-named product at a lower figure. Pig iron is almost destitute of interest on the part of consumers. Scrap materials show a heavy decline, with the mills masters of the situation so far as there are any masters. All branches of the trade are reiterating that but little substantial relief is to be expected until the railroads resume buying on a scale that will cause tonnage output to assume normal proportions. With one large independent mill, foreign inquiries have subsided somewhat and the supposition is that consumers abroad now have a better idea of American products and prices. With another mill, which specializes in plates, inquiries from abroad show no falling off, but actual business has not resulted from them.

Iron Ore.—Imports at this port in the week ended October 17 were 6450 tons from Cuba, 6076 tons from Sweden and 3280 tons from Spain.

Pig Iron.—The range of prices for eastern Pennsylvania No. 2 X is $14.50 to $14.75, delivered here. There is little now heard of $15 iron and sellers are trying to get $14.75. Some proffers by consumers have been so low that one producer said he would bank his furnaces before he would lead the way to the suggested level. Specialties are selling better than regular foundry iron, and for them there is no impairment in price. As for the regular foundry grade, consumers explain when they are solicited for orders that the demand for their product is so light that the iron they have under contract is more than sufficient for their needs. Many of them point out that even with curtailed working forces they are working shorter hours. The freight rate on Virginia iron delivered in this district is now established at $2.75 in place of $2.80 and $3, the water and rail and all-rail rates which prevailed formerly, and the price of Virginia iron is correspondingly lower. Steel-making irons of all kinds are inactive. Quotations for standard brands for early delivery in buyers' yards in this district are as follows:

Eastern Penna. No. 2 X foundry	$14.50 to $14.75
Eastern Penna. No. 2 plain	14.25 to 14.50
Virginia No. 2 X foundry	..... 15.25
Virginia No. 2 plain	..... 15.00
Gray forge	13.50 to 13.75
Basic	..... 14.00
Standard low phosphorus	21.00 to 21.50

Ferroalloys.—Dealers' quotation for 80 per cent. ferromanganese is unchanged at $68, seaboard, although odd lots of resale material could probably be had at less. For 50 per cent. ferrosilicon the quotation is $71 to $73, Pittsburgh, according to quantities.

Bars.—On small inquiries 1.35c., Philadelphia, is still asked for steel bars, but 1.30c. is done wherever a fair-sized quantity is involved. An important maker says that specifications were fairly good last week, a requirement of 450 tons from a railroad having brought the average up. A Baltimore manufacturer of gas holders and machinery has been in the market for a moderate-sized quantity. Iron bars are without change at about 1.12c., Philadelphia.

Plates.—Specifications have been a trifle heavier with one mill in this territory, but on the whole the market, if anything, is weaker. The general quotation is 1.30c., but a Baltimore firm which was inquiring for a good round tonnage is reported to have placed at least a part of the business below the market.

Structural Material.—New business is quieter and there is a lack of desirable propositions which would afford a true test of prices. Orders booked in August and September have so far carried one Eastern mill along at a fair rate of activity, but operations are now beginning to taper off. The contract for the Allentown high school, involving about 500 tons, has been awarded to the Steel & Wike Company, engineer, Philadelphia, and it is understood that the Bethlehem Steel Company will do the fabricating. Pier 36 of the Philadelphia & Reading Railroad, which was destroyed by fire recently, will be rebuilt by Lewis F. Shoemaker & Co., who built the original pier. About 1000 tons will be required. The Pen Argyl shops of the Lehigh & New England Railroad Company are still pending.

Billets.—Local makers are quoting on a basis of $20, Pittsburgh, or $22.40, Philadelphia, for open-hearth rolling billets, but the market is very quiet. For forging steel $4 more is asked.

Sheets.—A prominent maker in eastern Pennsylvania reports the volume of orders to be smaller, although the mill in question is running full on orders booked in recent weeks. For No. 10 blue annealed sheets 1.55c., Philadelphia, is quoted.

Coke.—The quotation for prompt delivery furnace coke is $1.65 to $1.70 per net ton at oven and for prompt foundry, $2.25 to $2.35. Extreme dullness prevails. Freight rates to this city from the principal producing districts are as follows: Connellsville, $2.05; Latrobe, $1.85, and Mountain, $1.65.

Old Material.—The market has reached a stage where consumers are virtually making their own prices. Although there have been a few recent sales of heavy melting steel at $10, the mills are unwilling to pay over $9.50 and they are not eager to buy at that. For delivery in buyers' yards in this district covering eastern Pennsylvania, and taking freight rates from 35c. to $1.35 per gross ton, quotations are as follows:

No. 1 heavy melting steel	$9.50 to $10.00
Old steel rails, rerolling (nominal)	11.50 to 12.00
Low phosphorus heavy melting steel scrap	13.50 to 14.00
Old steel axles	13.00 to 13.50
Old iron axles (nominal)	17.50 to 18.00
Old iron rails (nominal)	13.00 to 14.00
Old carwheels	9.50 to 10.00
No. 1 railroad wrought	11.50 to 12.00
Wrought-iron pipe	9.50 to 10.00
No. 1 forge fire	8.00 to 8.50
Bundled sheets	8.00 to 8.50
No. 2 busheling	7.75 to 8.25
Machine shop turnings	7.50 to 8.00
Cast borings	7.50 to 8.00
No. 1 cast	11.00 to 12.00
Grate bars, railroad	8.00 to 8.50
Stove plate	8.00 to 8.50
Railroad malleable (nominal)	9.00 to 9.50

Secretary Daniels of the Navy Department has awarded the contract for one battleship to the Newport News Shipbuilding & Dry Dock Company at its class 2 bid of $7,115,000, and for another battleship to the New York Shipbuilding Company at its class 1 bid of $7,250,000. The third ship of the series will be built at the New York Navy Yard, which bid $7,155,300 for a vessel built according to the department's design of hull and machinery and made an alternate bid of $6,922,859 for a vessel built according to the department's design of hull and with electric propulsive machinery.

Cleveland

CLEVELAND, OHIO, October 20, 1914.

Iron Ore.—Several ore firms will bring down their last cargoes next week. As very little ore will be shipped in November the shipping season will practically close November 1, or a full month earlier than usual. We quote prices as follows: Old range Bessemer, $3.75; Mesaba Bessemer, $3.50; old range non-Bessemer, $3; Mesaba non-Bessemer, $2.85.

Pig Iron.—Sales are very light. Some spot shipment orders are being taken for foundry iron, mostly in carloads, but consumers are showing no interest in future requirements. The market is not firm, and one Valley interest is now quoting No. 2 foundry at $12.75. A few small lot sales of prompt shipment Southern iron are reported at $10, Birmingham, for No. 2. Low-phosphorus iron is inactive, although a few new orders are reported in lots up to 100 tons. Corrigan, McKinney & Co. have completed the relining of one of their Cleveland furnaces. It was the intention to blow this stack in as soon as it was ready, but it has now been decided to keep it out of blast indefinitely. We quote, delivered Cleveland, as follows:

Bessemer	$14.90
Basic	$13.75 to 13.90
Northern No. 2 foundry	13.75
Southern No. 2 foundry	14.00 to 14.25
Gray forge	13.25
Jackson Co. silvery, 8 per cent. silicon	17.55
Standard low phosphorus, Valley furnace	20.25 to 20.50

Coke.—No sales of furnace coke are reported, and there is little demand for foundry grades. Foundry coke is weak. Some makes that have been held at $2.50 are now quoted at $2.35. Quotations range from $2 for second-grade foundry coke to $2.25 to $2.50, the latter price being for best-known makes. For prompt shipment standard furnace coke is quoted at $1.60 per net ton at oven.

Finished Iron and Steel.—Orders are almost entirely for small lots and scarcely enough business is coming out to test prices. The Lakeside plate mill of the Otis Steel Company and both Cleveland rolling mills are shut down, and the steel plant of the Upson Nut Company, now in partial operation, will probably be entirely shut down within a day or two. On steel bars 1.15c., Pittsburgh, appears to be the general quotation, except for small lots, for which mills are still asking 1.20c. There is practically no demand for iron bars, which are quoted at 1.15c. to 1.20c., Cleveland. The demand for plates has fallen off and prices are weak. Sales of round lots are being made at 1.10c., Pittsburgh. The only structural job placed is 720 tons for the Ames Building, Cleveland, which went to the McMyler-Interstate Company. Bids have been taken for 100 tons for the city filtration plant buildings, and bids will be received October 23 for about 500 tons for the Lindner Building. New bids will probably be asked for the boat dock buildings in Cleveland, as the bids recently received exceeded estimates. New demand for sheets is not active and prices are irregular. While some small lot sales are being made at 2c. for No. 28 black and 3c. for No. 28 galvanized, these prices are being shaded $1 to $2 a ton. Blue annealed sheets are selling at 1.40c. for No. 10. A few sales of forging billets in carloads are reported at $24.50, Pittsburgh. Warehouse prices are 1.80c. for steel bars and 1.90c. for plates and structural material.

Bolts, Nuts and Rivets.—There is a slight improvement in the demand for bolts and nuts. The price situation shows little change, the market still being weak. New demand for rivets is very light and specifications on contracts are only fair. Round lots are offered at $1 a ton lower than regular quotations, which are 1.50c. for structural rivets and 1.60c. for boiler rivets. The demand for bolts, nuts and rivets is about 50 per cent. of the capacity of the plants. We quote discounts as follows: Common carriage bolts, ⅝ x 6 in., smaller or shorter, rolled thread, 80 and 20 per cent.; cut thread, 80 and 15 per cent.; larger or longer, 75 and 15 per cent.; machine bolts with h. p. nuts, ⅝ x 4 in., smaller or shorter, rolled thread, 80 and 25 per cent.; cut thread, 80 and 20 per cent.; larger or longer, 80 per cent.; coach and lag screws, 80 and 25 per cent.; square h. p. nuts, blank or tapped, $6.30 off; hexagon h. p. nuts, blank or tapped, $7.20 off; c. p. c. and t. square nuts, blank or tapped, $6 off; hexagon, ⅝ in. and larger, $7.20 off; 9/16 in. and smaller, $7.80 off; semi-finished hexagon nuts, ⅝ in. and larger, 85, 10 and 5 per cent.; 9/16 in. and smaller, 85, 10, 10 and 5 per cent.

Old Material.—Most of the transactions reported are between dealers. Prices are weaker on most grades. A local mill is offering only $9 for old heavy melting steel scrap and there is apparently plenty to be had at that price. The Valley price on this grade is $10 to $10.25. An embargo has been declared against the Upson Nut Company and little material is being taken by Valley mills. Any one wishing to buy scrap can pick up all the material they want at very low prices. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton

Old steel rails, rerolling	$11.00 to $11.75
Old iron rails	12.00
Steel car axles	12.00 to 12.50
Heavy melting steel	8.75 to 9.25
Old carwheels	10.75 to 11.00
Relaying rails, 50 lb. and over	23.00 to 25.00
Agricultural malleable	8.50 to 9.00
Railroad malleable	9.75 to 10.00
Light bundled sheet scrap	7.50 to 8.00

Per Net Ton

Iron car axles	$16.75 to $17.00
Cast borings	5.75 to 6.00
Iron and steel turnings and drillings	5.25 to 5.50
Steel axle turnings	6.75 to 7.25
No. 1 busheling, new	8.00 to 8.25
No. 1 busheling, old	7.75 to 8.00
No. 1 railroad wrought	9.50 to 10.00
No. 1 cast	10.00 to 10.25
Stove plate	7.50

Cincinnati

CINCINNATI, OHIO, October 21, 1914.—(*By Wire.*)

Pig Iron.—It is reported that a few Northern producers have advised consumers that they are willing to take on some first quarter business based on the present price of $13 at furnace. Little if any business has been done. Southern furnaces are slow in putting out any open quotations for next year, but it is reasonable to assume that a few favored customers have been informed as to the producers' ideas on first-quarter prices. There is so much iron overdue on old contracts that not much buying may be expected for nearby delivery unless the melt is appreciably increased. A number of local jobbing foundries are now running full, due to the receipt of large foreign orders for lathes. A rumor was circulated to-day that the Japanese government was in the market for 50,000 tons of Southern iron, but the only active inquiry from that source here calls for 2000 tons of low-phosphorus iron for early shipment. The absence of railroad business has worked quite a hardship on the malleable melters, and there are no indications of any improvement from this source. There is also no demand for basic, and in this immediate territory the consumption of this grade has lately been further curtailed. Based on freight rates of $2.90 from Birmingham and $1.20 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft.	$13.40 to $13.90
Southern coke, No. 2 f'dry and 2 soft.	12.90 to 13.45
Southern coke, No. 3 foundry	12.40 to 12.90
Southern No. 4 foundry	11.90 to 12.40
Southern gray forge	11.40 to 11.90
Ohio silvery, 8 per cent. silicon	17.20 to 17.70
Southern Ohio coke, No. 1	15.20 to 15.70
Southern Ohio coke, No. 2	14.20 to 14.70
Southern Ohio coke, No. 3	13.95 to 14.20
Southern Ohio malleable Bessemer	14.20
Basic, Northern	14.45 to 14.95
Lake Superior charcoal	15.25 to 17.25
Standard Southern carwheel	26.90 to 27.40

(*By Mail*)

Coke.—The demand for both furnace and foundry coke continues very light. An improvement is observed in shipping specifications for foundry coke due on old contracts, but this is principally from local foundries making a specialty of machine-tool castings. A slightly better movement of domestic coke is noted. Connellsville 48-hr. grades are quoted around $1.70 to $1.85 per net ton at oven, but the average price on Pocahontas furnace coke is close to $2. Foundry coke is quoted at $2 to $2.25 at oven, for any shipment this year.

Finished Material.—A comparatively large order for reinforcing concrete rods will be placed this week by a local company for use in the construction of a large city sewer. Other business in sight is only for small orders that are sent in by different building contractors. It is understood that the sheet situation is unchanged, as far as the galvanized product is concerned, and the number of prompt shipment orders booked continues encouraging. We quote No. 28 black sheets at 2.15c., f.o.b. Cincinnati, or Newport, Ky., and No. 28 galvanized at 3.15c. Store prices on steel bars and light structural shapes remain around 1.80c.

Old Material.—With the exception of orders for small lots of cast scrap from a few foundries, there is no demand to report in this territory. The larger users of old material, notably the rolling mills, have enough bought and on hand to last several months. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations are dealers' prices f.o.b. at yards:

Per Gross Ton

Bundled sheet scrap	$6.00 to $6.50
Old iron rails	10.75 to 11.25
Relaying rails, 50 lbs. and up	19.50 to 20.00
Rerolling steel rails	9.75 to 10.25
Melting steel rails	8.50 to 9.00
Old carwheels	9.50 to 10.00
Heavy melting steel	8.25 to 8.75

Per Net Ton

No. 1 railroad wrought	$7.75 to $8.25
Cast borings	3.75 to 4.25
Steel turnings	3.75 to 4.25
Railroad cast scrap	9.00 to 9.50
No. 1 machinery cast scrap	9.75 to 10.25
Burnt scrap	5.75 to 6.25
Old iron axles	14.25 to 14.75
Locomotive tires (smooth inside)	9.00 to 9.50
Pipes and flues	5.75 to 6.25
Malleable and steel scrap	6.75 to 7.25
Railroad tank and sheet scrap	4.75 to 5.25

Buffalo

BUFFALO, N. Y., October 20, 1914.

Pig Iron.—Inquiry and sales have both been very small, although shipments on contracts have gone out in fair volume. The foundry melt of the district is probably not over 25 per cent. of normal, while in some lines it is down to about 15 per cent. The situation as to lack of demand is something unprecedented. There has been a decided downward trend of prices in the week, and for local district sales the range is now from $12.25 to $13.00. The differentials between the various grades have been largely eliminated temporarily. Conditions surrounding each sale govern the price. We approximate prices as follows for fourth-quarter delivery, f.o.b. furnace:

No. 1 foundry	$12.75 to $13.00
No. 2 X foundry	12.25 to 12.75
No. 2 plain	12.25 to 12.75
No. 3 foundry	12.25 to 12.75
Gray forge	12.25 to 12.75
Malleable	12.50 to 12.75
Basic	13.25 to 13.75
Charcoal, regular brands and analysis	16.25 to 17.25
Charcoal, special brands and analysis	20.50

Finished Iron and Steel.—Very light business is reported, including specifications on fourth-quarter contracts. Sellers still claim 1.20c., Pittsburgh, in spite of rumors of 1.15c. on steel bars in the eastern part of the State. Export business is developing into actual orders, not only in wire products, but in other finished lines. In fabricated structural lines the Buffalo Structural Steel Company has a 200-ton contract for the American Motion Picture Company, Utica, and the Seneca Engineering Company, Montour Falls, N. Y., 900 tons for the Cornell University drill hall.

Old Material.—The market is in a rather chaotic condition, with a feeling of uncertainty as to prospects for the future, and the entire price list is weaker. Several small sales of heavy melting steel have been made at $10 delivered at buyers' plant, Buffalo. Some of the large users in the Pittsburgh and Valley districts are out of the market and this trade avenue is completely closed to Buffalo dealers. No sales have been made of iron or steel axles or railroad malleable of sufficient proportions to base quotable prices on them. We therefore continue last week's schedule on these commodities, although they are undoubtedly affected by the lower prices in other lines. We quote dealers' selling prices per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	$9.50 to $10.00
Low phosphorus steel	12.50 to 13.00
No. 1 railroad wrought scrap	9.50 to 10.00
No. 1 railroad and machinery cast	10.00 to 10.50
Old steel axles	11.50 to 12.00
Old iron axles	17.00 to 17.50
Old carwheels	10.50 to 11.00
Railroad malleable	9.00 to 9.50
Machine shop turnings	5.50 to 6.00
Heavy axle turnings	7.50 to 8.25
Clean cast borings	6.00 to 6.50
Old iron rails	11.25 to 11.50
Locomotive grate bars	9.00 to 9.50
Stove plate (net ton)	8.75 to 9.25
Wrought pipe	7.00 to 7.50
Bundled sheet scrap	6.25 to 6.50
No. 1 busheling scrap	7.75 to 8.25
No. 2 busheling scrap	5.00 to 5.50
Bundled tin scrap	10.50

Birmingham

BIRMINGHAM, ALA., October 19, 1914.

Pig Iron.—It is difficult to believe statements regarding the pig iron situation made by manufacturers of this district. One reports the sale of only 250 tons and another only 100 tons up to October 15. Nothing like it was ever heard of before in the history of the Southern iron business. Production continues on the basis existing the past several months, but output must be soon curtailed unless conditions better. The sales that have been made were in Southern territory and the price was $10.25. There is no interest expressed in the price basis because there are no inquiries. Hold-up orders add to the stagnation. No one seems to have an idea when the break in the dead-lock will come. Birmingham iron can be bought as low as $10, and the same price would apply in Tennessee and northern Alabama with more generality. The hold-up orders are especially in evidence on high grades. Not only foundry but basic iron is encountering less home consumption. However, the steel plant of the Tennessee Company is scheduled to be in full operation before the end of the week, the idle open-hearth furnaces having been fired. It is possible, however, that there will be another partial shut down later on if rail orders do not pick up. We quote, per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft	$10.50 to $11.00
No. 2 foundry and soft	10.00 to 10.50
No. 3 foundry	9.50 to 10.00
No. 4 foundry	9.25 to 9.75
Gray forge	9.00 to 9.50
Basic	10.00 to 10.25
Charcoal	23.50 to 24.00

Cast-Iron Pipe.—Birmingham pipe works have secured a number of recent municipal waterworks contracts. A 2000-ton order from Texas, which at first went East, has been secured by the American Company, and the National as well as the United States has also received orders from Western points. An 8000-ton Mississippi contract is to be awarded this week. Quotations have been shaded on attractive specifications from 25c. to $1 per ton. Operations are on a 65 to 70 per cent. basis in water-pipe factories. Sanitary shops are closed or are on short time. Pacific coast business has been virtually booked on the freight basis of $2.75 and $3 to Mobile and New Orleans and $6 thence by steamship.

Coal and Coke.—Cool weather has stimulated the domestic trade and benefited the smaller mines. Steam coal mines are operating from three to four days a week owing to a decrease of about 30 to 35 per cent. in consumption by the railroads as well as reduced takings by the cottonseed oil mills and some textile industries. The bunker trade has not yet recovered the volume of business done prior to the war, but it is improving each week. Coke would sell much lower but for the meager supply. We quote, per net ton, f.o.b. oven, as follows: Furnace coke, $2.75 to $2.90; foundry, $3.15 to $3.40.

Old Material.—Scrap dealers report the same stagnation as exists in pig iron. Quotations are purely nominal, and even at the lowered figures very little is being done outside of such grades as stove plate. Deal-

ers are shy in taking on stocks. We quote, per gross ton, f.o.b. yards, as follows:

Old iron axles	$13.00 to $13.50
Old steel axles	12.50 to 13.00
Old iron rails	12.00 to 12.50
No. 1 railroad wrought	8.50 to 9.00
No. 2 railroad wrought	7.50 to 8.00
No. 1 country wrought	8.00 to 8.50
No. 2 country wrought	7.00 to 7.50
No. 1 machinery cast	9.50 to 10.00
No. 1 steel scrap	8.00 to 8.50
Tram carwheels	8.50 to 9.00
Stove plate	8.00 to 8.50

St. Louis

ST. LOUIS, MO., October 19, 1914.

Pig Iron.—Sales probably aggregate the lowest of the year. A number of feelers have been put out, however, which seem to indicate a reviving interest. Foundries are melting from 30 to 50 per cent. of capacity.

Coke.—Practically no coke business has been done. The prices for Connellsville and Virginia foundry and furnace cokes are at the low level prevailing elsewhere. By-product is held at the Connellsville basis plus $2.80 freight, delivered St. Louis.

Finished Iron and Steel.—None of the fabricators or the implement and wagon concerns seem inclined to take anything except for special purposes. Specifications have been held down to the lowest possible basis. Inquiries from contractors indicate that some work is in anticipation. The price basis has been put flatly at 1.15c., Pittsburgh, on contracts for structural material, etc. Movement out of warehouse is light and quotations are as follows: Soft steel bars, 1.70c.; iron bars, 1.65c.; structural material, 1.80c.; tank plates, 1.80c.; No. 10 blue annealed sheets, 2c.; No. 28 black sheets, cold rolled, 2.55c.; No. 28 galvanized, black sheet gauge, 3.55c.

Old Material.—The only list out for the week is one of 600 tons from a local industry, and the only material moving at all is No. 1 machine cast scrap available at present prices for founders' use instead of pig iron. We quote dealers' prices, f.o.b. St. Louis, as follows:

Per Gross Ton	
Old iron rails	$10.50 to $10.75
Old steel rails, rerolling	10.75 to 11.00
Old steel rails, less than 3 ft.	10.00 to 10.25
Relaying rails, standard section, subject to inspection	21.00 to 23.00
Old carwheels	10.50 to 10.75
No. 2 railroad heavy melting steel scrap	9.50 to 9.75
Shoveling steel	7.50 to 8.00
Frogs, switches and guards cut apart	9.50 to 9.75
Bundled sheet scrap	4.50 to 4.75
Per Net Ton	
Iron angle bars	$9.50 to $10.00
Steel angle bars	8.25 to 8.50
Iron car axles	16.25 to 16.75
Steel car axles	11.25 to 11.75
Wrought arch bars and transoms	10.50 to 11.00
No. 1 railroad wrought	7.50 to 7.75
No. 2 railroad wrought	7.50 to 7.75
Railroad springs	8.75 to 9.00
Steel couplers and knuckles	8.25 to 8.75
Locomotive tires, 42 in. and over, smooth	8.25 to 8.75
No. 1 dealers' forge	7.25 to 7.75
Mixed borings	3.50 to 3.75
No. 1 busheling	6.75 to 7.00
No. 1 boilers, cut to sheets and rings	5.25 to 5.75
No. 1 cast scrap	9.00 to 9.50
Stove plate and light cast scrap	7.75 to 8.25
Railroad malleable	7.50 to 7.75
Agricultural malleable	7.00 to 7.50
Pipes and flues	5.25 to 5.75
Railroad sheet and tank scrap	5.25 to 5.50
Railroad grate bars	6.75 to 7.00
Machine shop turnings	4.50 to 4.75

Boston

BOSTON, MASS., October 20, 1914.

Old Material.—The dealers are sitting tight, watching the situation with unusual keenness. Although their prices are unchanged, actual values are not easy to determine. The quotations given below, which are largely nominal, are based on prices offered by the large dealers to the producers and to the small dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points which take Boston rates from east of Pennsylvania points. In comparison with Philadelphia prices the differential for freight of $2.30 a ton is included. Mill prices are approximately 50c. per ton more than dealers' prices.

Heavy melting steel	$8.50 to $8.75
Low phosphorus steel	13.75 to 14.75
Old steel axles	13.25 to 13.75
Old iron axles	21.25 to 21.75
Mixed shafting	12.00 to 12.25
No. 1 wrought and soft steel	9.00 to 9.25
Skeleton (bundled)	5.50 to 5.75
Wrought-iron pipe	8.00 to 8.25
Cotton ties (bundled)	6.25 to 6.50
No. 2 light	3.75 to 4.25
Wrought turnings	5.00 to 5.50
Cast borings	5.25 to 5.75
Machinery cast	11.25 to 11.50
Malleable	8.00 to 8.25
Stove plate	7.75 to 8.00
Grate bars	5.25 to 5.50

New York

NEW YORK, October 21, 1914.

Pig Iron.—The situation is less promising and prices are weaker. Low as the rate of consumption of foundry iron has been, it is probable other furnaces will blow out before the equilibrium is restored. Buffalo iron has been sold at lower prices, and $12.25 to $12.50 at furnace for No. 2 X is considered the range on sales for Eastern delivery. Inquiries amounting to about 1500 tons have come up in New Jersey and most of this iron is expected to be closed within the week. Further concessions are reported on sales made by eastern Pennsylvania furnaces, while other furnaces are refusing to meet some of the prices that have been quoted on early delivery. Little interest is shown in 1915 iron. Two New Jersey sales recently made were for 1200 and 500 tons respectively, all for delivery this year. We quote Northern iron for tidewater delivery as follows: No. 1 foundry, $14.50 to $14.75; No. 2 X, $14.25 to $14.50; No. 2 plain, $13.75 to $14. Southern iron is quoted at $14.75 to $15 for No. 1 and $14.25 to $14.50 for No. 2.

Ferroalloys.—An absence of sales and inquiries for 80 per cent. ferromanganese characterizes the market, which is duller than before the war. Some further inquiry for foreign account is heard of, but thus far no sales have developed. It is thought that this comes from Swedish and Russian sources. British official statistics state that in September English producers of ferromanganese shipped to this country about 13,000 tons. Consumers are not anxious as to the immediate future, as they are receiving supplies quite regularly on contract. The present quotation is $68, seaboard. Ferrosilicon, 50 per cent., is still selling at $71 to $73, Pittsburgh, according to quantity.

Finished Iron and Steel.—Increasing numbers speak of early betterment apparently not yet borne out by order books but based on real or imagined prescience. Buying is extremely small in volume and spotty and practically all for immediate shipment. Much is still heard of inquiries for export, but many of these are intangible both as regards buyer and terms of payment. This applies even to railroad cars for shipment abroad, and practically the only definite request for cars for export comes from Okura & Co., 30 Church street, New York, for 300 42-in. gauge 4-wheel cars for Japan. Incidentally domestic inquiries for cars are not yet encouraging, one road having postponed a recent intention of buying 1000 box cars and one other road, asking for figures on 1000, now being regarded as a doubtful buyer. The Southern Pacific is again considering electric passenger cars, but this time 24, almost half the number before the market weeks ago. The Norfolk & Western is also a likely buyer of 40 passenger equipment cars. The Louisville & Nashville has bought 700 steel underframes for car construction in its own shops, 250 from the American Car & Foundry Company and 450 from the Mt. Vernon Car Mfg. Company. Building work is dead. The largest award learned of covers about 900 tons for the Philadelphia & Reading pier, Philadelphia, to Lewis F. Shoemaker & Co. We quote mill shipments of steel bars, shapes and plates at 1.15c. to 1.20c., Pittsburgh, or 1.31c. to 1.36c., New York, and iron bars at 1.25c., New York. For lots from store we quote iron and steel bars at 1.80c. to 1.85c., New York, and plate and structural material at 1.85c. to 1.90c.

Cast-Iron Pipe.—It is understood that the leading cast-iron pipe interest was low bidder on the letting of 2123 tons by Lyons, N. Y., October 17. No public lettings of importance have been announced this week.

Private buying is about normal for the season, but without feature except for the continued low prices prevailing. An inquiry is out for about 1000 tons for Havana, Cuba. Buyers in other countries are asking prices here, but it cannot be learned that anything of consequence has been closed. Carload lots of 6-in. are to be had at $20 to $20.50 per net ton, tidewater. The old firm of R. D. Wood & Co., Philadelphia, may go into receiver's hands as the result of disagreement between the owners of the property.

Old Material.—A sale of 500 tons of heavy melting steel scrap was made a few days ago to an eastern Pennsylvania steel company at $10, delivered, but it is not believed that over $9.50 could now be obtained. A little business is being done in cast scrap for foundry use, but nothing in rolling-mill stock. The low level to which prices have fallen is indicated by the result of an offer of about 300 tons of old carwheels by the Isthmian Canal Commission. The lot was sold at $7.35 per net ton, which is the equivalent of $8.23 per gross ton, on barge in New York harbor. It is almost impossible to sell old steel axles of standard size, of which stocks are in oversupply. The prices of all old materials are lower than last week, and in the present almost stagnant condition of the business still lower prices are looked for. Dealers' quotations are as follows, per gross ton, New York:

Old girder and T rails for melting	$7.25 to $7.50
Heavy melting steel scrap	7.25 to 7.50
Relaying rails	19.50 to 20.00
Rerolling rails	8.50 to 9.00
Iron car axles	14.50 to 15.00
Steel car axles	10.75 to 11.25
No. 1 railroad wrought	9.00 to 9.50
Wrought-iron track scrap	8.50 to 9.00
No. 1 yard wrought, long	8.00 to 8.50
No. 1 yard wrought, short	7.25 to 7.50
Cast borings	5.50 to 6.00
Wrought turnings	5.25 to 5.75
Wrought pipe	7.25 to 7.75
Carwheels	8.50 to 9.00
No. 1 heavy cast, broken up	9.50 to 10.00
Stove plate	7.25 to 7.50
Locomotive grate bars	6.00 to 6.50
Malleable cast	6.75 to 7.25

Chicago

CHICAGO, ILL., October 21, 1914.—(*By Wire.*)

The impoverishment of order books is not meeting with much relief. Such scattering orders as make up the aggregate weekly tonnage for most of the steel mills come from a wide variety of sources and not particularly as a response to any sales efforts. The railroads are doing some fall repair work to be completed before cold weather, and this is responsible for the buying of some rails and track fastenings. A Southern road has divided its order for 1000 cars with two builders, and the steel for half of them has been ordered from the mill. The number of structural jobs let last week is somewhat larger, but the aggregate tonnage is only 2500 tons. In plates and shapes the extension of low-price contracts and the acceptance of unspecified tonnages of the previous month are forms of price concessions. The nominal price for sheets remains undisturbed, but evidences of lower quotations are more conspicuous. It is very doubtful that the average mill is operating much above 40 per cent. of capacity. The pig-iron market is still dragging, with no important tonnages under consideration. Old material prices continue their downward trend.

Pig Iron.—It is not easy to detect evidences of any marked improvement among the foundries, although in different sections of this district one finds both extremes of activity. For the most part, also, foundry yards are fairly well stocked with pig iron. Inquiry the past week has included some lots of 500 and 600 tons, which, taken with somewhat freer requisitions for coke, indicate a slight advance in the general average of operations. Although the third quarter is well under way, there is comparatively little interest in next year's contracts. Inquiry for pig iron for export grows. It is estimated that there is fully 20,000 tons under consideration in this market, and dealers report their ability to secure very favorable rates. The situation has not changed as regards prices, except for the more general leveling of the Southern market to the basis of $10, Birmingham. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace and do not include a local switching charge averaging 50c. a ton:

Lake Superior charcoal	$15.75 to $16.75
Northern coke foundry, No. 1	13.50 to 14.00
Northern coke foundry, No. 2	13.00 to 13.50
Northern coke foundry, No. 3	12.75 to 13.25
Southern coke, No. 1 f'dry and 1 soft	14.50 to 14.75
Southern coke, No. 2 f'dry and 2 soft	14.00 to 14.25
Malleable Bessemer	13.00 to 13.50
Standard Bessemer	17.00
Basic	12.75 to 13.25
Low phosphorus	20.00 to 20.50
Jackson Co. and Ky. silvery, 6 per cent.	16.90 to 17.40
Jackson Co. and Ky. silvery, 8 per cent.	17.90 to 18.40
Jackson Co. and Ky. sil'vy, 10 per cent.	18.90 to 19.40

(*By Mail*)

Rails and Track Supplies.—Orders for 500, 1000 and 1500 tons of rails have been taken during the week, and there have also been sales of a considerable quantity of track fastenings. An inquiry is in the market for about 2000 tons of tie plates. While this improved activity on the part of the railroads is in a measure encouraging it hardly represents more than urgent necessities for fall maintenance work. We quote standard railroad spikes at 1.50c. to 1.60c., base; track bolts with square nuts, 1.90c. to 2c., base, all in carload lots, Chicago; tie plates, $25.50 to $26, f.o.b. mill, net ton; standard section Bessemer rails, Chicago, 1.25c., base; open hearth, 1.34c.; light rails, 25 to 45 lb., 1.25c.; 16 to 20 lb., 1.30c.; 12 lb., 1.35c.; 8 lb., 1.40c.; angle bars, 1.50c., Chicago.

Structural Material.—The Nashville, Chattanooga & St. Louis Railroad has placed the order for 1000 box cars, giving 500 to the Mt. Vernon Car Mfg. Company and 500 to the Missouri Car & Foundry Company. Orders for about 2700 tons of steel for these cars have already been placed. The awards for fabrication last week included 136 tons for the Order of Moose at Mooseheart, Ill., to the American Tower & Tank Company, Elgin; 258 tons for the St. Paul Railroad to the Wisconsin Bridge & Iron Company; 350 tons for a hospital at Chicago to the Laudenheimer Company; 282 tons for the Morshead apartments, San Francisco, to the Judson Mfg. Company; 105 tons for the Minnesota Steel Company, and 135 tons for a tower tank at Hibbing, Minn., to the American Bridge Company; 852 tons for the International & Great Northern Railroad to the Wisconsin Bridge & Iron Company, and 134 tons for the Chicago State Hospital at Dunning to A. Bolter's Sons. An award was made of 275 tons for a sanitarium at West Baden, Ind. There is some inquiry for material for next year's delivery, but very little contracting is being done, largely due to the reluctance of the mills. Prices are unchanged from last week, and we quote for Chicago delivery from mill 1.30c. to 1.33c.

We quote for Chicago delivery of structural shapes from jobbers' stock, 1.75c.

Plates.—Orders continues scarce and the mills have little upon which to support the solicitation of business at anything better than the minimum prices. There is a little tank business going, and some demand for plates for special purposes. A small tonnage of car underframe plates was booked during the week. We continue to quote for Chicago delivery of plates from mill 1.28c. to 1.33c.

We quote for Chicago delivery of plates from store, 1.75c.

Sheets.—New business in sheets, which was among the last to show a decline in volume, has now dwindled to meager proportions. Quotations of 1.90c. and 2.90c., Pittsburgh, are again appearing for No. 28 black and galvanized respectively. We quote for Chicago delivery from mill: No. 10 blue annealed, 1.58c.; No. 28 black, 2.08c. to 2.18c.; No. 28 galvanized, 3.08c. to 3.18c.

We quote for Chicago delivery from jobbers' stocks as follows, minimum prices applying on bundles of 25 or more: No. 10 blue annealed, 1.95c.; No. 28 black, 2.55c.; No. 28 galvanized, 3.55c.

Bars.—Steel-bar specifications continue very thin, despite the reports of a better situation with the agricultural implement manufacturers. Neither is there any improvement in the demand for bar iron; in fact, the rate of activity for Western mills averages lower than a week ago. Hard steel bars reflect no great de-

mand but the market for this material is clearly defined on the basis of 1.25c. at the mill. We quote for mill shipments as follows: Bar iron, 1c. to 1.05c.; soft steel bars, 1.33c. to 1.38c.; hard steel bars, 1.25c. to 1.30c.; shafting in carloads, 65 per cent. off; less than carloads, 60 per cent. off.

We quote store prices for Chicago delivery: Soft steel bars, 1.65c.; bar iron, 1.65c.; reinforcing bars, 1.65c. base, with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting 60 per cent. off.

Rivets and Bolts.—Bolt and rivet quotations, while unchanged nominally, are decidedly ragged, and attractive business is certain to bring out concessions from nominal maximum discounts. We continue to quote from mill as follows: Carriage bolts up to ⅜ x 6 in., rolled thread, 85; cut thread, 80-5; larger sizes, 80; machine bolts up to ¾ x 4 in., rolled thread, 85-5; cut thread, 85; larger sizes, 80-5; coach screws, 85-10; hot pressed nuts, square head, $6.60 off per cwt.; hexagon, $7.60 off per cwt. Structural rivets, ¾ to 1¼ in., 1.58c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

We quote out of store: Structural rivets, 2.20c.; boiler rivets, 2.30c.; machine bolts up to ¾ x 4 in., 75-15; larger sizes, 70-10-10; carriage bolts up to ⅜ x 6 in., 75-10; larger sizes, 70-15 off; hot pressed nuts, square head, $6, and hexagon, $6.70 off per cwt.

Wire Products.—Business in wire products passing through this market offers nothing of noteworthy interest. It is of limited volume, and reports of improvement in the wire trade find whatever foundation they have in export business. We quote to jobbers as follows: Plain wire, No. 9 and coarser, base, $1.58; wire nails, $1.78; painted barb wire, $1.78; galvanized, $2.18; polished staples, $1.78; galvanized, $2.18, all Chicago.

Old Material.—Quotations for scrap are again lower this week in a number of instances. There has been some little inquiry for heavy melting steel for November delivery and some sales of rolling mill scrap taken at bargain prices are noted. Of recent railroad lists it is thought that no unusual portion has been placed directly with consumers, but rather that a considerable part of the material offered has not been sold. Scrap offerings during the week include 1500 tons from the Michigan Central and 800 tons from the New York Central lines. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Old iron rails	$11.00 to $11.25
Old steel rails, rerolling	10.00 to 10.50
Old steel rails, less than 3 ft.	9.25 to 9.75
Old carwheels	10.50 to 11.00
Heavy melting steel scrap	8.50 to 8.75
Frogs, switches and guards, cut apart	8.50 to 8.75
Shoveling steel	8.00 to 8.25
Steel axle turnings	6.50 to 7.00
Per Net Ton	
Iron angles and splice bars	$10.00 to $10.50
Iron arch bars and transoms	10.25 to 10.50
Steel angle bars	7.75 to 8.25
Iron car axles	13.75 to 14.25
Steel car axles	11.00 to 11.50
No. 1 railroad wrought	7.75 to 8.00
No. 2 railroad wrought	7.00 to 7.50
Cut forge	7.00 to 7.50
Steel knuckles and couplers	8.50 to 9.00
Steel springs	9.25 to 9.50
Locomotive tires, smooth	8.75 to 9.25
Machine shop turnings	4.75 to 5.00
Cast borings	4.75 to 5.00
No. 1 busheling	6.50 to 6.75
No. 2 busheling	5.25 to 5.50
No. 1 boilers, cut to sheets and rings	5.00 to 5.50
Boiler punchings	9.25 to 9.75
No. 1 cast scrap	9.00 to 9.25
Stove plate and light cast scrap	8.25 to 8.50
Grate bars	7.75 to 8.00
Railroad malleable	7.75 to 8.00
Agricultural malleable	7.50 to 7.75
Pipes and flues	5.50 to 5.75

Cast Iron Pipe.—The only new business for the immediate future in the way of municipal lettings is 150 tons for Findlay, Ohio, bids for which will be received October 26. Prices show some irregularity, and desirable tonnage is likely to bring out concessions. We quote as follows, per net ton, Chicago: Water pipe, 4 in., $26; 6 to 12 in., $24; 16 in. and up, $23.50, with $1 extra for gas pipe.

The United Steel Company, Canton, Ohio, placed its new 9-in. mill in operation October 19. The company is well supplied with orders and has been operating its plant double turn a portion of the time recently.

British Business Not Improving

Pig-Iron Trade Slow—Nothing Doing in Steel—Canada Competing for Rail Orders

(By Cable)

LONDON, ENGLAND, October 21, 1914.

Business is very narrow, although the general tone is rather better on the improved war news. Export buying of pig iron is small and home trade slow. Nothing is doing in semi-finished steel, America asking too much. Tin plates are dull. Sheets are easy, orders being badly wanted. Rails are slow and Canada is competing sharply for desirable business. Finished steel products are dull generally. Stocks of pig iron in Connal's stores are 106,649 gross tons, against 107,132 tons last week. The number of furnaces in blast in the three districts is 162, against 191 at the same time last year. Such quotations as are available are as follows:

Tin plates, coke 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 12s. 7½d. ($3.07).

Cleveland pig iron warrants (Tuesday), 49s. 6½d. ($12.05), against 48s. 3d. ($11.74) last week.

No. 3 Cleveland pig iron, makers' price, f.o.b. Middlesbrough, 49s. 9d. ($12.10), against 49s. 3d. ($11.98) last week.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £9 2s. 6d. ($44.40).

Steel ship plates, Scotch, delivered local yards, £7 ($34.06).

Steel rails, export, f.o.b. works port, £6 2s. 6d. ($29.80), against £6 ($29.19) last week.

Hematite pig iron, f.o.b. Tees, 64s. ($15.57), against 64s. 6d. ($15.69) last week.

Sheet bars (Welsh), delivered at works in Swansea Valley, £5 ($24.33), against £5 2s. 6d. ($24.94) last week.

Steel joists, 15 in., export, f.o.b. Hull or Grimsby, £6 10s. ($31.62).

Steel bars, export, f.o.b. Clyde, £7 ($34.06).

Metal Market

NEW YORK, October 21, 1914.

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York			Lead		Spelter	
Oct.	Lake	Electrolytic	Tin, New York	New York	St. Louis	New York	St. Louis
14	11.75	11.37½	28.95	3.50	3.35	4.75	4.60
15	11.75	11.37½	28.40	3.50	3.35	4.75	4.60
16	11.75	11.37½	28.50	3.50	3.35	4.75	4.60
17	11.75	11.37½	.....	3.50	3.35	4.80	4.65
19	11.62½	11.25	28.70	3.50	3.35	4.80	4.65
20	11.50	11.25	29.00	3.50	3.35	5.00	4.85

New York

The decline in copper continues despite reports as to buying. Tin is lower than it was a week ago, but shows a tendency to advance. Lead is dull and prices are unchanged. Spelter is stronger in both price and demand. Antimony has considerable strength because of the foreign demand.

Copper.—In the latter part of last week and early part of this week some fair buying of electrolytic was reported, the quantities not being large but fair considering recent conditions. France has been a rather good purchaser, but the market to-day is dull. Ammunition makers have bought Lake and are ready to take more. They have expressed a willingness to pay a price equivalent to 11.65c., cash, New York. Lake prices are irregular as they range from 11.50c. to 11.75c. Electrolytic was quoted yesterday at 11.37½c., 30 days, delivered, or 11.25c., cash New York. The buying referred to was not felt by the trade at large and that it could not have been heavy is evidenced by the decline in prices. It is believed that 11.25c., cash, might be shaded a trifle if a good consumer wanted to buy a good round lot. Exports this month total 13,154 tons.

Tin.—It is announced that the London Metal Exchange may resume trading in all positions November

5, and abroad considerable uneasiness is felt as to what may follow. There is a little anxiety here. The London Exchange is now open to trading in spot deliveries and deliveries up to two weeks. The New York market is now working stronger because of the lighter imports and the feeling that there may be tightness in supplies before the month is over. This has had the effect of making sellers reluctant to quote as they anticipate higher prices. The quotation yesterday was 29c., which was a slight advance over the previous day. October 14 there were fair sales as low as 28.87½c. and up to 29c. October 15 was very dull, quotations earlier that day being around 28.62½c. while at the close the market was weak at 28.25c. There was quite an active market October 16 when the conditions of the previous day were reversed, early quotations being 28.20c. while at the close 28.62½c. prevailed. On October 19 there were light sales with prices ranging 28.65c. to 28.75c. Yesterday the market was firm, but dull at 29c., the greater strength being due to predictions of a shortage. To-day over 29c. is asked. Arrivals this month total 1463 tons and there is afloat 2300 tons.

Lead.—Throughout the week there has been practically no business and the market is dull at 3.50c., New York, and 3.35c., St. Louis. The one encouraging feature that is seen from the viewpoint of the seller is that some leading producers in Missouri have curtailed their output fully 25 per cent. It is believed that this will strengthen the market in a very short time. That quotations will go no lower is believed probable also for the reason that the average cost of production is about the present selling price.

Spelter.—The market yesterday was strong at about 5c., New York, and 4.85c., St. Louis, while to-day it is at least 10 points higher, the strength being due to inquiries from abroad, chiefly England, which have resulted in some good buying. There has been some spelter bought on domestic account also, but the market is chiefly bolstered up by the buying for foreign consumers, who are said to have taken about 2500 tons. Incidentally, the market is given further strength by the curtailment of production.

Antimony.—Spot stocks of antimony are said to have been almost entirely depleted because of the purchasing by agents of Russia, which is anxious to get a good stock of antimony before its ports are closed for the winter. Chinese antimony was taken in particular. Prices range around 13½c. to 14c. for Cookson's, 13c. for Hallett's, and 12c. for Chinese, although the buying was mostly at figures somewhat less. The market is irregular, prices being regulated by the inquiries as they come out.

Old Metals.—Quotations are again lower, with a continued quiet market. Dealers' selling prices are nominally as follows:

	Cents per lb.
Copper, heavy and crucible	11.00 to 11.25
Copper, heavy and wire	10.75 to 11.00
Copper, light and bottoms	9.75 to 10.00
Brass, heavy	8.25 to 8.50
Brass, light	6.25 to 6.50
Heavy machine composition	10.50 to 10.75
Clean brass turnings	7.50 to 7.75
Composition turnings	9.25 to 9.50
Lead, heavy	3.25
Lead, tea	3.00
Zinc scrap	3.50

Chicago

OCTOBER 19.—The very low price for copper has induced a considerable buying to cover requirements. Tin quotations are lower and concessions in lead for good specifications are the rule. The export of lead from local smelters to Europe is a feature of the situation. We quote as follows: Casting copper, 11.75c.; Lake copper, 12c., for prompt shipment; small lots, ⅛c. to ¼c. higher; pig tin, carloads, 29.50c.; small lots, 32.50c.; lead, desilverized, 3.43½c. to 3.47½c., and corroding, 3.75c., for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 4.75c.; Cookson's antimony, 16c. for cask lots; other grades, 12c. to 14c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 10c.; copper bottoms, 8.50c.; copper clips, 9.50c.; red brass, 9c.; yellow brass, 6.50c.; lead pipe, 3.10c.; zinc, 3.50c.; pewter, No. 1, 22c.; tinfoil, 25c.; block tin pipe, 27c.

St. Louis

OCTOBER 19.—The non-ferrous metals have been dull and weak, but spelter seems a little firmer today. Quotations are as follows: Lead, 3.35c.; spelter, 4.65c.; tin, 32c.; Lake copper, 13c.; electrolytic copper, 12.90c.; Cookson's antimony, 14c. In the Joplin ore market zinc blende was in weak demand at $35 to $40 per ton for 60 per cent., while the premium grades brought as high as $43. Calamine was dull at $17 to $21 for 40 per cent., with the top settlements at $26. Lead ore was quiet at $40 for 80 per cent. Miscellaneous scrap metals are quoted as follows: Light brass, 5c.; heavy yellow brass, 7c.; heavy red brass and light copper, 8c.; heavy copper and copper wire, 9c.; pewter, 20c.; tinfoil, 26c.; lead, 3c.; zinc, 3c.; tea lead, 3c.

Iron and Industrial Stocks

NEW YORK, October 21, 1914.

Another week has passed with the New York Stock Exchange closed. Financial conditions are gradually growing better, and many interests are beginning to feel impatient over the continued absence of authoritative quotations on stocks and bonds, but no action has yet been taken toward opening the Exchange. It is believed that it cannot be deferred much longer.

Dividends

The Willys-Overland Company, regular quarterly, 1½ per cent. on the common stock, payable November 1.

The Amalgamated Copper Company, regular quarterly, ½ of 1 per cent., payable November 30. This is a reduction of 1 per cent. from the declaration last quarter.

War and the German Iron Trade

Among extracts from German papers that the London Ironmonger is making weekly are the following:

The Luxemburg correspondent of the Vossische Zeitung writes on September 24 that blast-furnace works have had to close a great part of their plant because they cannot get coke. The Gelsenkirchen Company still has five furnaces in blast at Esch. The steel and rolling mills at the company's Adolf-Emil works are running moderately. The furnaces have been damped down. The Burbach-Eich-Düdelingen works is keeping one furnace in blast in each of its branches with the exception of Eich, where all the furnaces have been blown out. The rolling mills are idle, but the hands are still kept on at other work at reduced wages. The Deutsch-Luxemburg Company at Differdingen is finding work for its men in the same way. All the furnaces of this company but one are out of blast, and its steel and rolling mills are idle. It was feared that the works would be damaged during the bombardment of Longwy, but they, as well as the works of the Ougrée-Marihaye Company, at Rodingen, have so far remained intact. The last named works are idle, all the men, mostly Belgians, having been dismissed. The Felten-Guilleaume works at Steinfort is also closed down.

In the wire trade, a leading wire company reports that on the outbreak of war the wire industry ceased almost entirely. The works were obliged to close partly, as so many of the skilled workmen were called out. No raw material was obtainable at first, owing to the shutting down of many of the steel works, and because freight movement was stopped. Home business, as far as orders from private firms are concerned, revived somewhat after the first successes of the German army, but has now become very dull again. Most of the work that is still being done is for war contracts.

The Association of German Foundrymen has adopted a resolution declaring the necessity of increasing the prices of all foundry products on account of the present economic conditions, but leaving it to the various groups to settle the increases in their particular districts. The association has also decided that no contracts for castings for delivery in 1915 shall be made until further notice. The lower Silesian and Saxon founders have already raised their price for all kinds of castings 10 per cent., and the Hesse-Nassau group 5 per cent.

Customs Decisions

BALL BEARINGS

The Board of United States General Appraisers has taken adverse action on protests filed by the Norma Company of America, New York, regarding the classification of parts of ball bearings under the present tariff act. The merchandise in controversy is described by the appraiser as "finished rings of iron or steel, parts of ball bearings. Duty was charged at 35 per cent. under paragraph 106, as "ball bearings, finished or unfinished, and parts thereof." The importer claimed that the articles are properly dutiable at only 20 per cent. under paragraph 167, as manufactures of metal. Altogether, the merchandise consisted of 10,000 steel rings in two sizes, invoiced as inner and outer rings respectively, the diameter of the inner rings being about ⅝ in., and of the outer rings about 1 3/16 in. Grooves have been cut on the outer periphery of the inner rings and on the inside of the large rings. When completely finished the articles are used as raceways for ball bearings. The decision holds that the evidence clearly shows that the articles as imported are actually parts of ball bearings, and that that is their sole use. It is accordingly held that duty was properly assessed.

CRUCIBLE STEEL STRIPS

Another decision under the new tariff relates to crucible steel imported by Willard B. Jackson, Boston. The appraiser returned the merchandise as consisting of "crucible cast steel, from 12¼ to 16¾ in. wide, and from 0.090 to 0.120 in. thick, varying from 32 ft. to 65¾ ft. in length." Duty was exacted as steel made by the crucible process, at 15 per cent. under paragraph 110. The claim was for duty at 12 per cent. under paragraph 105, as "strips of iron or steel not specially provided for." As the importer's evidence was faulty, the protest was overruled. This question is expected to come up again before the board with a complete record in order that the classification of this product may be settled under the present act.

BRONZE WIRE CLOTH

The board sustained a contention by Castle, Gottheil & Overton, Philadelphia, relating to the rate of duty to apply to bronze wire cloth imported under the tariff act of 1909. It was claimed dutiable at the rate of 45 per cent. as a manufacture of metal, whereas the collector imposed a tax of 45 per cent. and 1c. per lb. under paragraph 135, as metal manufactures having wire in the makeup. The action of the collector in assessing the 1c. per lb. duty is held erroneous.

STEEL IN STRIPS

Hermann Boker & Co., New York, were sustained in protests dealing with flat steel in strips imported under the act of 1909. It was returned as polished steel, and additional duty at the rate of 4/10 of 1c. per lb. was levied. The importers claimed that the strips were not polished within the meaning of the law, and that, therefore, no additional duty accrued. Considerable testimony was submitted by both the Government and the importers in support of their respective contentions. The proof offered shows that when the steel in question is finished in the rolls and coiled ready for shipment, dirt, rust, grease, etc., adhere to the surface of the articles. In order to make the merchandise more presentable, as well as to preserve it while in transit, this foreign matter is removed with an emery cloth. There is no attempt at polishing, nor is it desirable to produce a polished surface. The board finds that, considering the use to which this steel is put, polishing would be a needless economic waste. The collector is accordingly reversed.

The United Refrigerator & Ice Machine Company, Kenosha, Wis., has been made defendant in involuntary bankruptcy proceedings on petition of the Francis & Nygren Foundry Company, Chicago, and other creditors. The action grows out of the suspension of the Commercial Savings Bank, Racine, a month ago.

Proposed Philadelphia Plant of the Linde Air Products Company

The Linde Air Products Company, Forty-second Street Building, New York, has undertaken the construction of its No. 12 plant, which is to be located at the southeast corner of Eighteenth and Cambria streets, Philadelphia. It will occupy 135 ft. on Cambria street and is so located that direct connection is made with adequate railroad service. The building will be one story, fireproof, of brick, steel and concrete construction. The plans include a garage, which is to be fireproof in every particular.

The equipment of the plant will consist of the special Linde rectifying apparatus, together with the necessary air compressors, oxygen pumps, etc., all electrically driven, with individual drive. The apparatus, being of special design, is being built in detail by the Linde Company in its Buffalo plant. Construction work will be commenced at an early date, with the expectation of putting the plant in actual operation as soon as possible.

In planning this factory, the company is following its customary policy of anticipating large increases in the sale and use of oxygen and therefore space has been allowed for doubling the capacity. The initial installation, which is duplex, is calculated to produce an output of 2,000,000 cu. ft. of oxygen per month. The output when the second duplex unit is put into operation will be 4,000,000 cu. ft. per month.

The Linde Company has, in the past two years, built nine plants and others are in contemplation. It is the intention to continue the construction of plants in every locality where the possibility of an adequate demand seems to warrant.

Brass Manufacturers' Official Catalogue

The National Association of Brass Manufacturers, through William M. Webster, commissioner, City Hall Square Building, Chicago, announces that its new official catalogue is nearing completion and will be ready for distribution about January 1, when the new list prices will go in effect. This catalogue will contain about 200 pages, of the same size as those of the present official catalogue, but will be double its thickness and number of pages. All lists have been entirely changed. The book will contain many goods never before listed. The commissioner calls attention to the fact that the price of the catalogue quoted to the trade last July was based on the contract for printing made at that time, but owing to the European war and its consequences the printers have advanced their prices considerably. Orders received now will be filled as long as the original printing contract allows, but when this contract has been exhausted the revised prices of the catalogue will be about three times those quoted. The commissioner states that sales thus far run close to 86,000 copies. Those who desire to avail themselves of the old price of the catalogue should act promptly.

The Michigan Manufacturer and Financial Record, Detroit, Mich., has made its issue of October 10 a protective tariff number in view of the industrial conditions now prevailing. The issue has a number of interesting articles contributed by individuals of prominence. Among these contributions the leading position is accorded to one by George H. Barbour, vice-president Michigan Stove Company, Detroit, who gives expression to strong views under the title "We Cannot Be Too American." Mr. Barbour says, "We are credited with being a great country, but we do not support home institutions to the extent that we should."

The Lukens Iron & Steel Company, Coatesville, Pa., has prepared a table which is printed on heavy paper 14 x 19 in., giving the weights of flat-rolled steel per lineal foot, in thicknesses from 3/16 in. to 1½ in. and in widths from 6 in. to 50¾ in. Almost 4000 weights are given in the table. Copies may be obtained by those who have use for the compilation, by applying to the company.

OBITUARY

James E. York

James E. York died at his home in Brooklyn, N. Y., October 10, aged 68 years. He was born in Wednesbury, Staffordshire, England, received a common public school education, and began to work at 12 tending an engine supplying blast for a foundry and blacksmith shop. At 15 he was apprenticed to the roll-turning department in the Patent Shaft & Axletree Company. After serving his apprenticeship he worked some months in Stockton, England, and in 1867 came to America. In the winter of that year he worked with a construction gang in the Rensselaer Iron Works in Troy, N. Y. Early in 1868 he secured a position as roll turner with the Akron Iron Company, Akron, Ohio. In 1869 he went to Portsmouth, Ohio, with the superintendent of the Akron Iron Company, who had accepted a position as manager of the Valley Iron Company, Portsmouth. Remaining there until the company suspended operations, Mr. York in 1872 became roll turner for the Newport Rolling Mill Company, Newport, Ky., and the Mitchell & Tranter Company, Covington, Ky. In 1876 he accepted a position as superintendent of the Burgess Steel & Iron Works, Portsmouth, which he retained until early in 1880, when he went to Wisconsin and promoted a blast-furnace operation at Black River Falls. A year or so later he promoted and organized another blast-furnace company at Ashland, Wis. About 1885 he organized the York Universal Mill Company, under the patents of L. D. York and himself, and built a mill in Duluth, Minn., to roll structural shapes, but the mill did not operate long and only a few beams were made there. At this plant James E. York engaged the services of Henry Grey. The rolling of H-beams, for which this mill was designed, was subsequently successfully developed at Differdingen, Germany, by the Differdingen Iron & Steel Works, under the direction of Mr. Grey, assisted by L. D. York, and they turned out the first H-beams there September 23, 1901. The Bethlehem Steel Company is now producing these beams regularly. About 1906 James E. York and associates took a lease on some ore property in Venezuela, interested capital and commenced to mine and ship ore when President Castro canceled the concession. The Venezuelan Government subsequently made an award of $385,000 to reimburse American companies having Venezuelan concessions, and Mr. York's company may eventually recover its expenses. Suffering from ill health in recent years, he was unable to give active attention to business matters and died practically a poor man. He leaves his widow and one son.

ALFRED SANG, for some years a resident of Pittsburgh, and once vice-president of the Garland Corporation, died on October 13, from wounds received in the siege of Antwerp He was a lieutenant in the English bicycle corps and had been in active service since the British declaration of war. News of his death was received by the Garland Corporation, Pittsburgh, whose confidential agent he was in London. He was born in Paris, in 1874, of English parentage, and was graduated from a leading French technical school. In 1900 he located in Pittsburgh, becoming a member of the Garland Corporation. He was one of the first in this country to recognize the value of Sherardizing. He was a very progressive analaytical chemist, and made some important discoveries and improvements in the Sherardizing process. In June, 1909, he returned to Paris, taking over the Sherardizing patents for France, and established a plant; thence to London, where he formed the firm of Sang & Russell, metallurgical engineers. While in Pittsburgh, he was a member of the Engineers' Society of Western Pennsylvania, the American Society for Testing Materials and of the Electro-Chemical Society. He was particularly well known in this country as a writer on metallurgical subjects. He paid special attention to corrosion, and is the author of books on that subject and on galvanizing. He leaves his widow and three children.

DANIEL A. TOMPKINS, Charlotte, N. C., died October 18, aged 62 years. He was a native of South Carolina and was graduated from the Rensselaer Polytechnic Institute as a civil engineer in 1873. He learned the machinist's trade in the works of John A. Griswold & Co., Troy, N. Y., and was employed 10 years in the works of the Bethlehem Steel Company as machinist, draftsman, head draftsman and assistant to master mechanic. In 1880 he was master mechanic of the Crystal Plate Glass Works, Crystal City, Mo., and built a large addition to the plant. Since 1882 he resided at Charlotte, N. C., as president of the D. A. Tompkins Company, constructing cotton-seed oil mills and refineries, cotton mills, electric light plants, acid phosphate works, etc. He was also president of the High Shoals and Atherton cotton mill corporations and of the Underwriters' Fire Insurance Company of Greensboro, N. C. He was the author of a number of books, chiefly in connection with the cotton trade.

AXEL H. HELANDER, second vice-president and general manager of sales of the William Tod Company, Youngstown, Ohio, died at his home in that city October 17, aged 50 years. He had been ill for about three months with heart trouble, and his death was not unexpected. He was born in Vingaker, Sweden, came to America when a boy, and resided in Philadelphia and Pittsburgh for some years. He was for a time connected with the Mesta Machine Company, Pittsburgh, and went to Youngstown about two years ago. He was an expert in mechanical engineering and invented several devices that are now in use in rolling mill and steel works practice. He had traveled widely and was well known in Europe. He leaves his widow, two sons and two daughters. His brother, E. G. Helander, a mechanical engineer, resides in Youngstown.

WILLIAM H. RICHARDS, general manager of the Standard Tinplate Company, Canonsburg, Pa., died suddenly October 10 at the Washington Country Club, where he had gone to attend a meeting of the Manufacturers' Association of Washington County. He was born in Staffordshire, England, in March, 1858. When a young man he came with his parents to America, and began life in the tin mills of the Pittsburgh district. For a time he managed a tin-plate mill at New Kensington, removing to Canonsburg in 1904 to assume the management of the Standard Company. He had served in the town councils of both New Kensington and Canonsburg, and last spring Governor Tener appointed him a member of the board of managers of the Pennsylvania Training School at Morganza. He leaves his widow, three sons and a daughter.

WILLIAM ROBERT WHITE, chairman of the Robesonia Iron Company and for many years an active figure in local social and club life, died suddenly October 13 at his home in Philadelphia, aged 65 years. He had been ill for some time, but was able to attend to his duties. An acute attack of heart disease was the immediate cause of death. Mr. White was graduated from Yale in the class of 1868, and soon after went abroad, where he traveled for several years. On returning to Philadelphia he became interested in the iron business, his family owning the controlling interest in the Robesonia Iron Company. His wife died in 1905.

CHARLES M. GOULD, vice-president and secretary of the Gould Coupler Company, Depew, N. Y., died at his country home on Long Island, October 20, from pneumonia, aged 41 years. He was a son of Charles A. Gould, president of the company. He leaves his widow and four children.

ROSCOE H. STILSON, for 10 years connected with the Cleveland sales office of the Carnegie Steel Company and for some time engaged as a salesman of the company's specialties in the Cleveland territory, died suddenly October 18 of heart failure, aged 35 years.

AUGUSTUS WILDER SEXTON, Jr., treasurer of Westinghouse, Church, Kerr & Co., contracting engineers, New York City, died at his home in Montclair, N. J., October 1, aged 39 years. He was born in Staten Island and leaves his widow and a daughter.

RAILROAD RATE REHEARING

Interstate Commerce Commission Hears Fresh Arguments for 5 Per Cent. Increase

WASHINGTON, D. C., October 20, 1914.—The question as to whether the 35 railroad systems, embracing 112 railroad companies, in official classification territory, shall be permitted to advance their rates 5 per cent., a question of vital interest not only to the roads but to the industries, great and small, dependent thereon, was again presented to the Interstate Commerce Commission yesterday. Every fact of importance brought to the attention of the commission in the original case was emphasized by the railroad officials in their arguments at this rehearing, and in addition a deeply impressive statement of the cumulative conditions that have followed the outbreak of the disastrous European war was presented to Acting Chairman Clements and his associates, all of whom testified by their close attention their appreciation of the significance of the question at issue. Chairman Harlan, who is seriously ill, was the only absent member of the commission.

While it would be futile to attempt to foreshadow the outcome, it has been made clearly apparent in questions propounded by the commissioners and in their general attitude toward the carriers' witnesses that they appreciate fully the gravity of the matter now before them and that they are prepared to dispense as far as possible with all the bureaucratic red tape that might tend to prevent an early decision.

The broad basis of the claims of the carriers to the advance petitioned for was laid at the opening of the hearing by President Daniel Willard, chairman of the Presidents' Committee of the railroad companies. Quoting the admission of the commission, in its order of July 29 denying the increase, that "the net operating income of the railroads in official classification territory, taken as a whole, is smaller than is demanded in the interest of both the general public and the railroads." Mr. Willard stated that conditions which have since arisen demonstrated beyond argument that the downward tendency of operating income was progressive and threatened the very existence of the railroads. The combined statements of all the railroads involved in this proceeding for the fiscal year ended June 30, 1914, which have become available since the original case was closed, showed roundly, he said, that the total operating revenues that year were approximately $48,000,000 less than in the previous year, while the operating expenses in the same period were approximately $22,000,000 greater. The net operating income was equal to but 3.98 per cent. on the property investment, a lower return than was shown at any time in the preceding 15 years. The income applicable to interest, dividends and surplus was but 4.06 per cent. on the total capital obligations, this return also being lower than any in 15 years. The operating figures for July and August have been tabulated and also serve to emphasize the tendency toward diminishing net income which the commission found in the facts in the record as originally submitted.

While the additional figures submitted clearly establish a continuation of the recognized tendencies toward a diminishing net income, Mr. Willard said the actual situation which confronts the railroads today has become extremely critical. The problem is no longer one of tendencies but of actual reality. A war such as that now raging causes great and immediate disturbance to industry, commerce and finance. It causes contraction of credit and great restriction, if not the actual stoppage of international trade as well as serious disturbance to domestic commerce, and it has thrown the security markets of the world first into panic and then into suspension of operations. Ultimate and more lasting consequences are enormous destruction of wealth, with great diversion of labor and capital to unproductive employment, thus causing a check to the world's accumulation of new capital, and a serious and prolonged rise in the rate of interest. The effect of such higher interest rates will continue long after the present emergency has passed, because they will be reflected in the basis upon which the new securities will be issued from time to time as required for refunding and other purposes; and in so far as the war and its consequences tend to change the conditions surrounding the enlistment of new capital, they tend to change the fundamental relation between railroad and shipper.

Mr. Willard further said: It is known that the railroads of the United States have over $520,000,000 of outstanding obligations which will mature and must be met within the next 12 months alone. It was shown in the original record in this case that the railroads in official classification territory only had spent approximately $200,000,000 per annum upon their properties for improvements and extensions during the last ten-year period, and it will be necessary to continue such expenditures if the roads are to maintain their standard of service and provide for the growing needs of the future. Further, as nearly as can be ascertained, there are more than $3,000,000,000 par value of American railroad securities held abroad as investments. The demands for cash in Europe, growing out of the present situation, will doubtless result in large selling of such securities when the markets or exchanges are again opened, and the possible effect of such selling upon railroad credit and related subjects is causing much concern. With all this in mind, it will readily be seen that the available supply of and probable demand for new capital, as well as the interest rates thereon, are matters of great importance, not only to the railroads, but also to those who depend upon them for transportation, and in our opinion a proper determination of this case cannot be made unless these matters as affected by existing conditions be given full consideration.

An exhaustive analysis of the finances of the railroads was presented to the commission by George M. Shriver, of the Pennsylvania Railroad Company. These figures embraced the fiscal year statement for 1914, now for the first time available. The most striking feature of the 1914 returns, as presented by him, is the complete disappearance of surplus or margin. This surplus had averaged 1.28 per cent. on total capital obligations for the 14 years ended with 1913. In 1914, however, notwithstanding the fact that total dividends were $12,000,000 less than in 1913 and that dividends were at an average rate of only 4.58 per cent., the lowest rate in 10 years, there was a deficit of $8,203,287. Almost equally significant is the showing regarding the return on property investment. In 1914 the ratio of net operating income to property investment was only 3.99 per cent. against 5.36 in 1913, this ratio being the lowest in 15 years. In 1914 the sum available for interest, dividends and surplus amounted to but 4.06 per cent. on total capital obligations, a ratio much the lowest of any shown in the preceding 14 years. Previous to 1914 the ratio never fell below 5.8 per cent. Mr. Shriver's statement also embraced statistics specially compiled to show the operations of the three great systems—the Pennsylvania, New York Central and Baltimore & Ohio combined—these figures reflecting even more clearly the same general conditions which prevail as to the combined roads in official classification territory.

Following the direct evidence presented in behalf of the carriers, President Willard was recalled to the stand by Louis D. Brandeis, counsel for the commission, who cross-examined him at length. The only effect of this questioning was to induce the witness to give greater emphasis to his original statements.

It is understood that as soon as the case for the carriers is closed the commission will decide whether protestants are to be heard and, if so, will fix the dates for such hearings. A number of protests have been received, but neither their volume nor their substance is impressive. Fewer protests from repesentatives of the iron and steel industry are said to have been filed than were presented in the original case, but no information as to the identity of the protestants is now available.

W. L. C.

Since the beginning of the war the price of copper has fallen over £4 ($19.44) per ton in London, according to the London Ironmonger, and risen about £12 10s. ($60.75) in Germany. Tin, antimony and aluminum are slightly dearer in Germany since August 1, while lead and spelter are rather cheaper.

Book Reviews

Gas, Gasoline and Oil Engines. By Gardner D. Hiscox, M. E., and Victor W. Page, M. E. Pages, 640, 6 x 9½ in.; illustrations, 435. Published by the Norman W. Henley Publishing Company, 132 Nassau street, New York City. Price, $2.50, *net*.

In preparing this, the twenty-first edition of a book treating of the entire field of the explosive motor and its applications, considerable new matter has been included. Among this is material on the use of the gaseous elements of the blast furnace and coke manufacture. In addition an effort has been made to include striking examples of all the recent developments in the field of internal combustion engineering, such as the new types of automobile, airshaft and motorcycle power plants for farm and gas tractor motors, marine engines and their use. The section on marine motors has been enlarged and entirely new matter has been added on ignition, carburetion, lubrication and motor testing, as well as considerable descriptive matter relative to large ship motors and representative types of Diesel engines. A number of new tables and formulae have been included.

After outlining the basic and elementary principles of the gas power plant, various standard designs of internal combustion motors for all purposes are shown, the illustrations in many cases being direct reproductions of engineering and design drawings. The rules of the National Board of Fire Underwriters regarding the installation and management of gasoline motors and the location and management of producer gas plants are included.

Pattern Making. By Frederick W. Turner and Daniel G. Town. Pages V + 114, 5 x 7 in.; illustrations, 88. Published by John Wiley & Sons, Inc., New York City. Price $1, net.

This book, by two instructors in pattern making of the Mechanic Arts High School, Boston, is intended to present to the young pattern maker a general survey of the special tools, fundamental processes and materials best suited to the trade, as well as the relations of the pattern making department to allied ones, and especially those of the foundry. The detailed construction of typical patterns is not taken up.

The general trade relations and qualifications of a pattern maker are first discussed and followed by a statement of the effect that the principles of foundry and machine shop practice have upon the type of pattern. The allowances that have to be made for shrinkage, draft, finish and machining, are touched upon, with information as to the standard practice in these respects. The various tools employed are described briefly, followed by instructions on the making of pattern layouts and templates. The construction, polishing and finishing of the materials used in making the patterns are gone into at some length, followed by a discussion of the various types of patterns and the factors that determine their use. The construction of patterns, core boxes and cores, skeleton patterns and sweeps cover the next three chapters, and the final one is given over to systems for keeping track of drawings and patterns, and the precautions that have to be observed in the construction of patterns strong enough to withstand the strains imposed by the jar ramming or jolting machines now in use.

Hendricks's Commercial Register of the United States. Twenty-third annual edition. Pages, 1734, 7¼ x 10¼ in. Published by the S. E. Hendricks Company and supplied by *The Iron Age* Book Department, 239 West Thirty-ninth street, New York City. Price, $10, net.

As has been the case with each succeeding edition of this book, the number of pages has been increased, 99 pages having been added this year as compared with 60 in 1913. Included in this number are 16 additional pages in the index. The lists for buyers and purchasing agents are grouped under headings represented in the index by approximately 45,000 classifications and contain in the neighborhood of 350,000 names and addresses. The classifications specialize with great particularity in products used in the mechanical, mining, railroad, quarrying, contracting, electrical and milling fields, as well as a great variety of other general products. Matter formerly contained in "The Assistant Buyer," a trade directory covering in considerable detail material relating particularly to tools and machinery, which was formerly published by the Sullivan System, has been incorporated in the text, this firm having been combined with the S. E. Hendricks Company in the past year.

A special feature of the directory is the inclusion in parenthesis, between the names and addresses of the several firms given under the various classifications, of a large number of trademarks and trade names of goods. This enables a person using the book to find any particular article quickly and is of especial advantage where the article desired is of a type made by different manufacturers. In general, the arrangement of the classifications is the same as in the previous editions, so that the book can be used for either purchasing or mailing purposes, and a number of classifications which have been inserted for use in connection with publicity campaigns are indicated. A general heading for each industry is given under which all the manufacturers are included for mailing list purposes, and the names are repeated again under as many subclassifications as are required to index the products of each firm or corporation completely. A list of the abbreviations which are used in the body of the book to provide a maximum amount of information in a minimum of space is included.

Recent Contracts for Large Cooling Towers.

A number of contracts for condensing equipment and cooling towers have been awarded recently to the Wheeler Condenser & Engineering Company, Carteret, N. J. Included in these are two large contracts, one for a battery of cooling towers having a capacity of 600,000 gal. per hr. and one for a single tower of the same capacity, both being designed for operation in connection with surface condensers and turbines. The former, which is believed to be the largest cooling tower project ever undertaken, is being installed at the plant of the Texas Power Company, Waco, Texas. Although the capacity of the initial installation is only 600,000 gal. the ultimate capacity is twice that amount. The towers, six in number, are of the steel shell type arranged to form a battery 100 ft. long, 18 ft. wide and 40 ft. high. Six 10-ft. fans arranged in pairs operate at a speed of 250 r.p.m., being driven through belt connections by motors located above each pair in small motor houses. The housings of the fans are extended and have doors which, when opened, are relied upon to permit the unobstructed entrance of air for operation by natural draft during the winter season. Platforms are provided for access to the motors and the water distributers and regulating valves, which control the water discharge to each compartment and permit any section to be cut out for inspection or cleaning without interfering with the operation of the others. The water piping is designed for the ultimate installation.

Announcement has been made of the award to the Thurber-Browning Company, Cincinnati, Ohio, of the contract for the construction of the second section of the new Mill Creek sewer project in that city. This work will consist of approximately 6600 ft. of 72-in. reinforced concrete sewer paralleling Mill Creek through the northern factory district of Cincinnati, and will cost approximately $165,000. It involves a cut through the sand and clay deposit of Mill Creek Valley, 25 ft. in depth and in one place a 120-ft. tunnel under the creek. The Thurber Browning Company is a new concern recently organized in this business by H. Thurber and J. K. Browning, experienced engineers, with offices in the Andrews Building.

The Adams Brothers Company, Findlay, Ohio, which ments in the field of internal combustion engineering, has been in the hands of the receiver for some time, will be reorganized as a result of efforts made by the Business Men's Association of that city and reincorporated with a capital stock of $300,000. The new company will continue the manufacture of motor trucks and will be under the management of Murry Irwin, who has been manager of the Lewis Truck Company.

Mexican Imports from This Country

WASHINGTON, D. C., October 20, 1914.—Detailed figures of our foreign commerce for the fiscal year ended June 30, 1914, embrace some interesting statistics showing the effect of the war in Mexico on our exports to that country of iron and steel products. In nearly every important article embraced in the metal schedule, with the exception of firearms, there has been a large decrease. Administration officials express the opinion, however, that a radical improvement in all branches of our trade with Mexico will soon be recorded, and this view is supported by details of shipments from certain leading ports in the first quarter of the new fiscal year.

The foreign trade of Mexico under normal conditions is shown by an official statement prepared by the Mexican government just received by the Bureau of Foreign and Domestic Commerce, covering the fiscal year 1912, the latest yearly statistics for which Mexican authorities, because of the disturbed conditions in the country, have been able to complete. The total foreign trade of Mexico in 1912 was $240,375,000, comprising $91,331,000 imports and $148,994,500 exports, showing a favorable balance of trade of $57,663,000. Of the total imports the United States furnished $49,213,000, or a little more than one-half, while Germany supplied $11,922,500, and the United Kingdom $17,503,000. Of the total exports, the United States absorbed $112,000,000, or 75 per cent., while the United Kingdom took $20,099,500 and Germany $5,158,500. The decline in Mexico's foreign trade began early in the fiscal year 1913 and continued up to the latter part of the fiscal year 1914. For various reasons the imports of iron and steel from the United States did not share in the decline in 1913; in fact, there was an increase from $14,668,848 in 1912, to $15,520,601 in 1913. The greater part of this gain is accounted for by the single item of pipes and fittings intended for use in the construction of petroleum pipe lines, which shows a gain of more than $700,000.

The total exports of iron and steel and manufactures thereof from the United States to Mexico in the fiscal years 1912, 1913 and 1914 are shown in the following table, expressly prepared for *The Iron Age* by the Bureau of Foreign and Domestic Commerce:

Exports of Iron and Steel and Manufactures of	1912	1913	1914
Bar iron	$38,654	$57,131	$18,608
Steel bars and rods	69,672	75,586	34,678
Builders hardware and tools	958,407	913,585	157,839
Castings, n.e.s.	137,614	75,379	32,489
Firearms	354,533	269,014	488,274
Metal-working machinery	46,977	83,259	74,741
Mining machinery	1,325,354	1,671,724	1,316,017
Pumps	388,347	409,899	323,826
Sewing machines	533,152	712,655	316,775
Locomotives, steam	115,221	84,241	42,300
Other engines and parts	549,769	634,365	489,394
Typewriting machines	305,128	311,063	133,974
Woodworking machinery	196,571	94,621	23,163
All other machinery	1,987,540	2,296,636	995,710
Nails and spikes	166,316	196,048	92,429
Pipes and fittings	1,590,381	2,295,857	1,852,634
Rails	893,758	551,576	101,705
Sheets and plates	929,153	827,001	314,183
Structural shapes	358,716	441,757	296,824
Wire	656,587	593,480	213,632
All other iron and steel	3,066,998	2,925,714	2,102,615
Totals	$14,668,848	$15,520,601	$9,422,810

Reports received at the Bureau of Foreign and Domestic Commerce indicate a revival in the foreign trade of Mexico, especially in the item of imports in the last quarter of the fiscal year 1914. This increase has been by way of the gulf ports of Mexico, the receipts through the northern frontier ports continuing to show a decline. The removal of the embargo on firearms and munitions of war will result in an important increase in the shipment of these articles from the United States, and more normal conditions in the petroleum field will be reflected in increased importations from this country of pipes and fittings, pumping machinery, stationary engines, boilers, etc. W. L. C.

The so-called Clayton anti-trust bill, having been adopted by both branches of Congress in the form in which it came from the conference committee, was signed by President Wilson October 15. This completes the Administration's trust programme. There were no ceremonies connected with the signing of the bill.

Effect of War on Our Cuban Trade

WASHINGTON, D. C., October 20, 1914.—The effect of the European war on our trade with Cuba and the probability of a large increase in our shipments of machinery, tools, mill supplies and agricultural implements to the island, are the subjects of a report which the Department of Commerce has received from the United States consulate at Havana. Supplementing this report, the Bureau of Foreign and Domestic Commerce has compiled expressly for *The Iron Age* the statistics of our exports to Cuba of iron and steel products in the fiscal year just ended as compared with 1913 and 1912. These figures show very substantial totals which, however, are now likely to be materially increased owing to the inability of German and English producers to supply their former quota.

The total foreign trade of Cuba in the fiscal year 1913 was approximately $300,000,000, comprising $135,810,000 imports and $165,208,000 exports. It is believed that the figures for 1914 will show little if any change. Of the imports the United States supplied $71,754,000, while the United Kingdom furnished $16,097,000, and Germany $9,515,500. According to the figures of the Bureau of Foreign and Domestic Commerce our exports to Cuba in 1914 declined slightly, the total being $68,884,428. Of the exports from Cuba in 1913, the United States took $132,581,000, while the United Kingdom absorbed $15,663,000, and Germany $6,498,000. During the fiscal year 1914 we exported to Cuba, according to our own statistics, goods valued at $131,303,794. Our exports to Cuba in 1902, two full years after the Spanish-American war, aggregated only $26,623,500, from which it appears that the gain in 1914 was 395 per cent. Our imports from Cuba in 1902 amounted to $34,694,684, the gain in 1914 being no less than 285 per cent. The United States now furnishes about three-fourths of Cuba's consumption of iron and steel products and, according to the trade experts of the Department of Commerce, there is no reason why we should not supply practically all of these goods used in the island, especially in view of the tariff concessions which American products enjoy under the reciprocity treaty. The following table shows the total exports of iron and steel and manufactures thereof from the United States to Cuba in the three fiscal years, 1912, 1913 and 1914:

Exports of Iron and Steel and Manufactures of	1912	1913	1914
Builders hardware	$136,947	$173,347	$238,614
Carwheels	60,164	40,735	66,883
Castings	53,288	64,021	44,529
Cutlery	52,095	56,105	55,933
Locomotives	280,786	424,863	678,615
Stationary engines	129,687	135,559	76,428
All other engines	431,101	579,818	682,833
Printing presses	129,969	39,222	204,002
Pumps	415,076	359,452	291,350
Sewing machines	382,920	398,692	360,976
Typewriting machines	111,984	104,635	94,407
All other machinery	2,317,437	2,766,895	2,526,116
Cut nails	44,216	31,589	24,983
All other nails and tacks	202,527	222,082	189,765
Pipes and fittings	1,016,423	1,021,391	909,434
Rails	1,094,364	949,870	908,280
Scales and balances	86,138	117,396	99,799
Sheets and plates	419,748	396,756	163,002
Structural shapes	548,566	723,794	531,854
Tools, n.e.s.	386,990	330,373	301,968
Wire	509,991	427,551	421,142
All other iron and steel	2,540,000	2,783,351	2,710,621
Totals	$11,350,817	$12,173,397	$11,386,534

It is probable that, notwithstanding the bright outlook for high sugar prices in Cuba, due to the war in Europe, the total volume of Cuba's import trade for the current fiscal year will fall below that of 1914, while that portion contributed by the United States will show a material increase. If, however, sugar prices are as high the coming year as present conditions seem to indicate, our consular representatives in Cuba predict that there will be a very heavy demand for machinery, agricultural implements and miscellaneous manufactures of iron and steel, which will be supplied from the United States if our exporters are reasonably diligent in looking after this trade. Attention is called to the fact that transportation facilities are still very good, notwithstanding the withdrawal of steamers of two lines which touched at ports in eastern Cuba, and there should be little difficulty in the matter of securing shipping. There are no banking and exchange embargoes or moratorium obstacles to trade in Cuba. W. L. C.

The Lesson of the Present Industrial Situation

In an address on "Panic Economies and Engineering Problems with Special Reference to the Present Industrial Situation," delivered Tuesday evening, October 20, at 29 West Thirty-ninth street, New York City, under the auspices of the American Society of Mechanical Engineers, Frederick A. Waldron, industrial engineer, New York City, enumerated the lessons to be learned as follows:

That the world is growing smaller.

That nations are more inter-dependent for internal financial and industrial prosperity.

The more civilization advances, the more nations cooperate in this advance.

The lessons of thoroughness and preparedness are driven home.

That this country is deficient in merchant marine.

That shipping and banking facilities with countries which are used as a basis for the Monroe Doctrine are controlled by the English, the French and the Germans.

That our factories are not prepared to meet the demands of trade for such countries.

That the mental attitude of take what is made or leave it must be changed if we expect to obtain and hold the trade of other American nations.

That whatever the outcome of this war may be, it will be the engineering of the past 40 years that develops the successful nation.

Factories that are near supply points, he thinks, ought to reduce the amount of materials carried in stock to a minimum and buy on short notice. If materials were handled the same as money and distributed from territorial storehouses as requirements demanded the burden of speculative losses would be eliminated. It could be done if sound and broad business methods were substituted for the speculative craze of the individual who lives by his wits at the expense of some loser.

Conferences on Trade with Spain and France

It has been reported to the Bureau of Foreign and Domestic Commerce that there is an urgent desire on the part of Spain to promote trade with the United States. Special efforts are being made to obtain direct steamship lines and to encourage the establishment of branches of an American bank in Spain. Dr. C. W. A. Veditz, recently appointed commercial attaché at Paris, has been directed to proceed first to Spain and make a thorough investigation of the best means for promoting trade between Spain and the United States. Before sailing he is planning to visit Boston, New York, Philadelphia and Chicago for consultation with the manufacturers and exporters who are interested in the trade with Spain as well as with France.

Frames for French Army Motor Trucks Ordered

The Parish Mfg. Company, Reading, Pa., has been given an order for the frames for the motor trucks the Pierce-Arrow Company will supply to France. Published statements regarding the Pierce-Arrow contract refer to 300 cars; but the contract to the Parish company calls for 350 frames. Work has been in progress on the order, which must be filled in 60 days. The first shipment was scheduled to be made to the Pierce-Arrow factory in Buffalo, N. Y., on October 9.

The Burden Iron Company, Troy, N. Y., resumed operations in the manufacture of bar iron and horseshoes October 12, after an idleness of four months. The workmen, who had refused to accept a reduction of wages, which caused the suspension of operations, decided to reconsider their action and to return to work at a meeting addressed by President James A. Burden and Mayor Cornelius F. Burns.

The Vonnegut Machinery Company has leased the building at 121 South Meridian street, Indianapolis, Ind., as sales rooms for its second-hand machinery department. The new machinery sales will continue to be handled from 43 South Meridian street, and to the previous line of equipment wood-working machinery has been added.

Lackawanna Steel Company's Earnings

The Lackawanna Steel Company has issued its statement of earnings for the third quarter of 1914. A deficit of $457,210.46 is shown, which compares with a deficit of $338,472.93 in the preceding quarter and a profit of $1,109,202.75 in the third quarter of 1913. The statement, which impressively shows the depressed condition of the steel trade, is as follows:

	1914	1913	Decrease
Income from manufacturing and operating after deducting all expenses incident thereto, including ordinary repairs and maintenance of plants and interest on bonds and fixed charges of subsidiary companies.....	$196,566.12	$1,839,514.03	$1,642,947.91
Proportion of earnings on investments in companies not controlled, and of other annual income	107,268.80	168,210.28	60,941.48
Total	$303,834.92	$2,007,724.31	$1,703,889.39
Deduct interest on Lackawanna Steel Company bonds and debentures outstanding	437,425.00	437,416.62	8.38†
Balance	$133,590.08*	$1,570,307.69	$1,703,897.77
Less charges and appropriations for the following purposes. Sinking funds on bonds and exhaustion of minerals	$106,073.29	$113,495.46	$7,422.17
Depreciation and accruing renewals.	217,547.09	347,609.48	130,062.39
Total deductions..	$323,620.38	$461,104.94	$137,484.56
Profit for 3d quar.	$457,210.46*	$1,109,202.75	$1,566,413.21

* Deficit.
† Increase.

For the nine months ended September 30, 1914, the deficit was $1,240,890.48, which compares with an operating profit of $2,864,398.28 in the corresponding period of 1913, thus showing a decrease of $4,105,288.76.

The unfilled orders on hand September 30 were 166,344 gross tons, against 128,880 tons June 30 and 255,945 tons September 30, 1913.

Birmingham Meeting of the Steel Institute

Indications now are that the attendance at the meeting of the American Iron and Steel Institute at Birmingham, Ala., October 29, 30 and 31, will be about 300. Most of the members attending from the East will leave Tuesday afternoon, reaching Birmingham Wednesday night. At Chicago and Cleveland special railroad arrangements have been made for the members from those districts. The first session will open at the Hotel Tutwiler Thursday morning, when the president, Judge Gary, will make an address. The excursion on Friday will take in a number of points outside of Birmingham, while Saturday will be devoted largely to the Ensley works of the Tennessee Coal, Iron & Railroad Company.

The Jeffrey Mfg. Company, Columbus, Ohio, has begun the publication of a monthly house organ known as the Jeffrey Service. The October number, which is the second, is designated as the building and loan issue, and contains an article on the work of the Jeffrey Building and Loan Association. A number of illustrations of houses that have been built through money loaned by the association serve to supplement the text. This association is one of the forms of welfare work of the company, which includes an employees' restaurant and a co-operative store.

The rail mill and open-hearth furnaces of the Tennessee Coal, Iron & Railroad Company, Ensley, Ala., resumed normal operations on Monday, October 19, after a shutdown since October 1. Continuity of operations depends on the rail market. One or two departments of the American Steel & Wire Company at Fairfield, Ala., have shut down for several days for repairs.

PERSONAL

Herman H. Westinghouse, brother of the late George Westinghouse, was, on October 15, elected president of the Westinghouse Air Brake Company. The directors, besides himself, elected at the same time are Cyrus S. Gray, E. M. Herr, A. L. Humphrey, J. R. McGinley, Charles McKnight, John F. Miller, Morris S. Rosenwald, W. D. Uptegraff. The new president was born in Central Bridge, near Schenectady, N. Y., in 1853, attended local schools and afterward Sibley College of Engineering, Cornell University. He is the inventor of the high-speed single acting engine for the manufacture and sale of which the Westinghouse Machine Company was organized in 1880. He went to Pittsburgh in 1873 at the invitation of his brother to assist in the management of the Westinghouse Air Brake Company, and has for many years been first vice-president.

Dean C. B. Connelley, of the School of Applied Industries, Carnegie Institute of Technology, Pittsburgh, has been appointed a member of the committee on industrial education of the American Foundrymen's Association. The work of the committee is to further among the members of the association the project of broadening the scope of vocational training in public schools.

Thomas McDonald, general superintendent of the Youngstown mills of the Carnegie Steel Company, is recovering from a serious illness.

Col. H. P. Bope, vice-president and general manager of sales of the Carnegie Steel Company, Pittsburgh, was guest of honor at a dinner given last week by prominent business men in St. Louis.

Otto Abrahamsen, treasurer of Beaudry & Co., Inc., 141 Milk street, Boston, Mass., has returned from a five months' trip abroad.

J. T. Stoney, formerly superintendent of the foundry of the Ferro Machine & Foundry Company, Cleveland, Ohio, has been appointed factory manager of the J. H. McLain Company, Canton, Ohio, manufacturer of heating equipment.

Herman G. Farr has resigned as chief engineer of the Knox Motors Company and will open an office in Springfield, Mass., as consulting engineer. He is a pioneer of the automobile industry, having in conjunction with Harry A. Knox designed one of the first successful gasoline cars in America. He has been with the Knox Company since it started 15 years ago.

Charles C. Western has taken over the interest of Zeno W. Day in the firm of Ahr & Day, manufacturers of purse and satchel frames as well as other metal specialties and die and tool making. Mr. Day has retired, and the business will hereafter be conducted under the style of Western & Ahr, at 473 Washington street, Hildner Building, Newark, N. J.

F. B. Lockhart, president and general manager of the Baltimore & Ohio Coal Company, Rockefeller Building, Cleveland, Ohio, will be associated from November 1 with the J. H. Hillman & Sons Company, Oliver Building, Pittsburgh, miner and shipper of Connellsville coke and Pittsburgh coal. Until other arrangements can be made by the Baltimore & Ohio Coal Company, Mr. Lockhart will act for it as heretofore.

H. S. Lewis, resident manager in Pittsburgh of the National Fuel Company, Uniontown, Pa., has resigned. The Pittsburgh office in the future will be in charge of C. R. Wilson, sales agent, assisted by R. H. Knode and Jules Gordon, of the Uniontown office.

S. Takekawa, civil engineer of the Imperial Government Railways of Japan, is making a tour of the United States, including several steel works centers.

W. R. Grace, vice-president Ingersoll-Rand Company, New York, has returned from Europe, where he has been for six months.

The Lake Superior Corporation

At the annual meeting of the Lake Superior Corporation, held October 7, President J. Frater Taylor presented a statement from which the following glance at the future is taken:

The European war is affecting operations, particularly those of the Algoma Steel Corporation, in two ways. Orders already booked have been indefinitely postponed, and, in many cases, canceled; while on the other hand there is a serious money stringency and some difficulty is being experienced in the collection of accounts due by certain large customers. The results in the past have been progressive and satisfactory, but future progress depends upon development in other lines than the manufacture of steel rails. The plant was in full operation until the end of August, from which time it has been operated at half capacity. The prospect is that for the next year, at least, there may be an insufficiency of rail orders to keep the works full, and that insufficiency will be more acutely felt on account of the war. The range of our production must be increased. Mills should be installed for the manufacturer of other steel products and structural steel and sheets, and the number of open-hearth furnaces increased, especially as, with the completion of the three great transcontinental lines, rail orders are likely to fall off.

Unfortunately, it is impracticable at present to look for assistance from London, from which source financing has hitherto been done. Development must continue, but in connection with the new moneys required, serious consideration must be given to the company's bonded debt. Full consideration must be immediately given to the steps necessary to complete the steel plant, as well as to the providing of further working capital.

President Taylor further says, in part: The aim of the management since 1909 has been to concentrate the company's resources in its largest earner, Algoma Steel Corporation, and in the allied industries essential thereto. All outside assets, with certain exceptions, have been sold and the proceeds applied to improvements and to the reduction of the Lake Superior Corporation's first mortgage bonds from $10,000,000 on June 1, 1910, to $5,708,000. The plant of the Algoma Steel Corporation, Ltd., now has a steel-making capacity of 500,000 tons annually, rail-rolling mills with a capacity of 400,000 tons and merchant mills with a capacity of 80,000 tons. In the fiscal year 1913-14 the company produced 114,782 tons of iron ore, 433,679 tons of coke, 311,904 tons of pig iron and 325,680 tons of steel rails. Its net earnings were much in excess of previous years, being $1,934,966, against which the charges were $1,238,814, leaving a balance to be added to surplus of $696,151.

The Bruce-Macbeth Engine Company, Cleveland, Ohio, reports orders recently received for two 150-hp. natural gas engines from Cincinnati and Pittsburgh and a 50-hp. producer gas engine and producer from North Dakota; also the sale of a 350-hp. four-cylinder gas engine direct connected to a 250-kva. generator to the municipality of Ford City, Pa. Shipments of gas engines running from 40 to 150 hp. have been made to various parties in three States, including a 135-hp., four-cylinder to the .Universal Rolling Mill Company, Bridgeville, Pa.

A mill which rolls sheet copper has just completed its first shipment to South America of several thousand pounds of copper circles. One of the difficulties encountered was preparing the circles, some of which were 72 in. in diameter, for shipment, inasmuch as the buyers refuse to have them boxed. They were inclosed in strips of band iron which were riveted where they crossed, and the ends clinched around the edges of the circles. The circles were of a type which have formerly been supplied by German makers.

The scarcity of copper, says the Rheinisch-Westfalische Zeitung, is already becoming very marked in Germany, as there are now only home stocks to draw upon. The state of the German brass industry on the whole is unsatisfactory, and no private trading is being done, the works only turning out war material. The brass founders have decided to grant a special cash discount of 1½ per cent. to customers who pay at the end of 30 days.

Pittsburgh and Nearby Districts

A. D. Williams, president Williams Tire Company, Glassport, Pa., states that his company has secured 10 acres of land near McKeesport on which a plant will be built for the manufacture of tires and other rubber products.

No. 1 blast furnace of the Dunbar Furnace Company, Dunbar, Pa., now owned by the American Manganese Mfg. Company, was blown in October 14. It is now running on foundry iron, containing 2 to 3 per cent. silicon and about 1 per cent. or under of manganese, and later may make other grades of iron. The company reports that it has on hand and is unloading about 26,000 tons of ore from the Cuyuna range in Minnesota, about half of which is standard iron ore and the other half manganese ore. The company also has about 75,000 tons of ore mined and at the docks at Duluth ready for shipment. It expects late this month to change the furnace over to spiegel and ferromanganese running from 30 to 40 per cent. Should prices warrant, the company may import foreign manganese ores and make ferromanganese up to 80 per cent., but this has not been definitely determined.

No. 3 blast furnace of the Republic Iron & Steel Company at Hazelton, Ohio, has been put out of blast for relining and repairs.

The plant of the American Steel Foundries at Franklin, Pa., was closed October 16 for an indefinite period on account of lack of orders. Other plants of the same ownership located at Pittsburgh, Sharon and Alliance, are only in partial operation.

The Titusville Iron Company, Titusville, Pa., manufacturer of boilers, tanks and steam, gas and gasoline engines, has bought land adjoining its plant on which it will erect a large office building in the near future.

Blast furnace C of the Youngstown Sheet & Tube Company, Youngstown, Ohio, was blown out October '14, and will not be put in operation again until there is an improvement in the steel business. This company has accumulated 80,000 tons of pig iron since January 1.

Coal producers in the Pittsburgh district will have a chance to bid on a contract for 300,000 tons of coal wanted by the railroads of Chile. The specifications for this contract cover about 25 typewritten pages. Bids are to be submitted to the Department of Materials, Santiago, Chile, by October 24, at 10 a. m. The contract is to cover a period of three years, and points of delivery and all other details incident to it are specified. This is the second large inquiry for coal which has come to the Pittsburgh district from South America since the breaking out of the European war.

The Pittsburgh Valve, Foundry & Construction Company, Pittsburgh, has filed a complaint against the Pennsylvania and other railroads with the Interstate Commerce Commission. Rates on valves shipped from the Pittsburgh district to Pacific coast points, particularly San Francisco, are claimed to be unjust. The commission is asked to establish a specific rate on motor-driven valves.

The National Tube Company, Pittsburgh, will close down its plant at Syracuse, N. Y., on account of dull trade. The report that the plant will be dismantled is incorrect. The company's Riverside works at Wheeling, W. Va., have been idle for some time.

The Monessen Southwestern and Johnstown & Stony Creek, two industrial railroads in western Pennsylvania, have been granted permission to unite with various other industrial railroads, several of which are owned by steel companies, in the proceedings for restoration of allowances before the Pennsylvania Public Service Commission. The evidence will be closed this week and argument heard early in November. Fourteen short lines have petitioned for the restoration of the allowances.

The Huntington Glass Brick Works, Huntington, W. Va., will build a plant 88 x 860 ft. F. D. Buskirk, Cincinnati, Ohio, is one of the organizers of the company.

Charles G. Smith has been appointed receiver of the Norwalk Motor Car Company, Martinsburg, W. Va., on petition of an officer of the company. The court granted permission to the receiver to borrow money for operating expenses and to continue the operation of the plant for two months, by which time it is believed the company will be reorganized. The plant was moved from Norwalk, Ohio, to Martinsburg three years ago and had apparently been prosperous.

The Valley Mold & Foundry Company, Sharpsville, Pa., has closed its plant this week and will probably not operate it next week, on account of lack of orders for ingot molds.

The new Western Reserve Steel Company, Warren, Ohio, is erecting buildings and foundations for an eight-mill unit, but for the present only five hot sheet mills and one jobbing mill will be installed. The plant will have also two galvanizing pots and a complete line of roofing and sheet metal machinery. The company will manufacture various styles of metal lathing. Construction work is going along well, and it is expected that the plant will be in operation by January 1. C. G. Thomas is president.

No. 1 blast furnace at the Ohio works of the Carnegie Steel Company in Youngstown, Ohio, was blown out October 17, for relining and repairs. Four of the six stacks are in operation.

Official announcement is made that the plant of the American Steel Foundries at Sharon, Pa., will soon close down for an indefinite period unless business conditions materially improve in the near future.

A plant will shortly be established in Franklin, Pa., under the name of Franklin Sheet Metal Works. F. J. Pickard is the proprietor. The products will include stove pipe, conductor pipe, gas furnaces and ornamental iron work.

The Everlasting Combined Metal Casket Company, Huntington, W. Va., incorporated with $30,000 capital stock, will build a plant to manufacture metal caskets and vaults. M. L. Duncan is president.

Connellsville, Pa., has been ordered by the health commissioner to erect a sewerage disposal plant which will cost about $300,000.

Large Cleveland Crane Orders

The Cleveland Crane & Engineering Company, Wickliffe, Ohio, has received some most attractive electric traveling crane business in the past two weeks. One order is from the Taylor-Wharton Iron & Steel Company for the following cranes for the plant this company is building at Easton, Pa., for the manufacture of manganese wheels, frog and switch work, etc.: Four 4-motor wall, 25 ft. reach; 16 4-motor wall, 20 ft. reach; 10 3-motor traveling, 57 ft. span; 1 3-motor traveling, 72 ft. 10½ in.; 1 10-ton 3-motor traveling, 58 ft. 1½ in.; 1 10-ton 3-motor traveling, 79 ft. 2¾ in.; 1 5-motor traveling, 72 ft. 10½ in.; 1 20-ton 5-motor traveling, 72 ft. 10½ in.

The company has also taken an order from the Pennsylvania Steel Company, Harrisburg, Pa., for two 3-motor electric traveling cranes, one with 58 ft. span and the other with 100 ft., and is building for the Bollinger-Andrews Construction Company two 4-motor electric traveling cranes with 68 ft. 3 in and 58 ft. 3 in. span respectively for its new plant now being erected at Josephine, Pa., for the manufacture of ingot molds in connection with Corrigan, McKinney & Co.'s blast furnaces. There are also just being completed at the Cleveland Crane & Engineering Company's plant three 50-ton 4-motor electric traveling cranes for the new power house of the Ford Motor Company, Detroit, Mich.

The James A. Spargo Wire Company, Rome, N. Y., has increased its capital stock from $50,000 to $200,000 as a preliminary toward consolidation with the Spargo Wire Cloth Company, both being under the same ownership and management. The statement is made that the name of the combination will be Spargo Wire Company. It is the expectation to add 100 looms to the present plant of 100 looms, weaving brass, copper and bronze wire cloth. The consolidated company will thus start with the drawing of wire in making its finished product.

The Machinery Markets

If the railroads were buying, the machine tool industry of this country probably would be enjoying an era of prosperity which certainly would exceed any in its history. The demand from abroad for machines and that which is indirectly caused by the war has continued to grow with a result that stocks of some kinds and sizes of tools are depleted and production facilities are taxed to make others. Incidentally, it is to be noted with satisfaction that some manufacturers are waking up to the need and wisdom of improving their plants regardless of the depression. Given a continued easiness in money and encouragement for the railroads, there are great things not far ahead. New York is getting business resultant from the war and sees more, as well as some good prospects of a more regular nature. In New England the call for engine lathes and automatics for foreign shipment has been heavy and the domestic business is better. Business has improved in Cleveland, where a good number of small inquiries are coming out and there is one attractive inquiry from an automobile parts manufacturer. Many lathes and milling machines have been bought in Cincinnati for export and the automobile makers are conspicuous as buyers. In Detroit a definite improvement is noticed, both in the machine-tool and foundry trades. In Milwaukee it is believed that a restoration of confidence has set in inasmuch as industrial extensions have been resumed. Business in the Central South is irregular. Birmingham reports that the mines are taking a normal quantity of equipment, while woodworking machinery is in better demand. In St. Louis new inquiry of importance has come out and the market is otherwise assuming a more favorable aspect. Trade in Texas is dull. In San Francisco there is little of an encouraging nature, all lines showing a falling off as compared with a month ago. In the Pacific Northwest agricultural machinery is active.

New York

NEW YORK, October 21, 1914.

Actual sales which run into large figures and bright prospects are evidences that the tide has turned and the current of business gives promise of soon being in full motion if it is not already. Not only are benefits directly due to the European war being felt, but some propositions independent of war influences are making business and giving promise of future activity. The heaviest buying has been on the part of the Bethlehem Steel Company. Recent orders placed by this company include twenty-two 20-in. American lathes, 20 Steinle turret lathes, 12 Warner & Swasey turret lathes, 16 Gridley automatics (in addition to those previously purchased), some Brown & Sharpe automatics and some miscellaneous machines, all required for fuses, timers and various forms of projectile work. The orders which made the purchase of these machines necessary were disappointing in size, but they may yet be added to, in which event more machine tools probably will be purchased. The expenditure so far is between $90,000 and $100,000. Two manufacturers are known to have been dissatisfied with the prices they could obtain for projectile work and it is likely that the Bethlehem Steel Company and another company located in Brooklyn may get the business.

W. R. Grace & Co., 7 Hanover square, New York, are receiving estimates on 200 lathes, which it is understood are to be exported to England. The machines specified are 14 and 16 in. double back-geared, three-cone, high-duty lathes.

The Baldwin Locomotive Works, Philadelphia, has an inquiry out for 50 large turret lathes and a number of engine lathes, presumably for export to Russia.

The Taylor-Wharton Iron & Steel Company, Highbridge, N. J., has placed with the Cleveland Crane & Engineering Company, Wickliffe, Ohio, an order for 35 cranes ranging from 5 to 20 tons capacity. The cranes with electrical equipment represent about $85,000. The motors for the cranes will be supplied by the Electro-Dynamic Company, Bayonne, N. J. The steam turbines for the new Taylor-Wharton plant at Easton, Pa., for which the cranes were purchased, will be supplied by the De Laval Steam Turbine Company, Trenton, N. J. while the generators and motors, there being about 180 of the latter, will be furnished by the General Electric Company. As heretofore stated the Taylor-Wharton Iron & Steel Company will require a large amount of machinery, which is now under consideration.

The Crocker-Wheeler Company, Ampere, N. J., in whose plant there have been many changes in personnel, of late, has quietly purchased a number of machine tools, including Norton grinders, Lodge & Shipley lathes. National-Acme automatic screw machines and an American radial drill and others will be purchased as plans mature for a general increase in production. Experts have been engaged in formulating the plans. An extension to the punching and shearing department of the plant is contemplated.

The Oliver Machinery Company, 50 Church street, New York, manufacturer of woodworking machinery, has sold a complete woodworking plant, to be used at the iron ore mines to be worked by the Bethlehem Steel Company in Chile. Shipment of the machines has been held up temporarily, but will soon go forward.

The United States Cast Iron Pipe & Foundry Company is in the market for a 10-ton crane for its plant at Addyston, Ohio, and the Alpha Portland Cement Company is inquiring for a 3-ton bucket crane for Martin's Creek, Pa.

The M. J. Daly Company, Waterbury, Conn., has placed an order with the Cleveland Punch & Shear Works Company for a combined punch and shear.

The Pennsylvania Steel Company has placed orders for one 50-ft. span and one 100-ft. span Cleveland crane of 10-ton capacity.

Other possibilities are mentioned in the trade under the seal of confidence. They are taking definite form and will result in buying soon. Reports from some of the manufacturing plants represented in New York are that they are on full time and may work a night shift to fill orders, especially for large sizes of machines, as these are in the greatest demand. From London word is received that stocks of American machine tools in that city have been sold out.

The Bureau of Foreign and Domestic Commerce, Washington, D. C., reports that bids will be received until March 30, 1915, for a water supply for Athens, Greece, and surrounding cities, at an estimated cost of $14,000,000.

The Turner Construction Company, 11 Broadway, New York City, has been awarded the contract for the construction of a grain elevator for Charles Schaefer & Son, 304 Meserole street, Brooklyn, N. Y. This building is to be 30 x 80 ft., six stories and basement, located at Townley, N. J. Hooper & Co., 118 Market street, Newark, are the architects.

Atlantic City, N. J., has sold $50,000 of waterworks bonds.

Runyon & Carey, engineers, 843 Broad street, Newark, N. J., will prepare plans and specifications for a complete water system at Overbrook Hospital.

The Saratoga Pilot Lamp Company, 15 Philadelphia street, Saratoga Springs, N. Y., has been incorporated by Charles H. Wallace and others. It will have its lamps manufactured under contract for the present.

Morris Hermann & Co., 878 Mt. Prospect avenue, Newark, N. J., will rebuild their dry color plant, which was recently damaged by fire. Henry Solomon is superintendent.

Bach Brothers has been incorporated by Max and Oscar Bach, George Dawson, and others, with a capital stock of $45,000 to manufacture architectural and ornamental iron work, etc. Plans for manufacturing are under consideration. Benjamin M. Kaye, 149 Broadway, New York City, is the attorney.

The Interlocked Metallic Hose Company, Orchard and Scott streets, Newark, N. J., has been incorporated by W. A. and J. T. Metcalf and W. E. Phillips to take over the business formerly conducted as a copartnership. It manufactures flexible hose, casing and tubing. No additional equipment is

contemplated beyond special machines built by the company itself. Walter E. Phillips is general manager.

The Beacon Miniature Electric Company, 108-110 Duane street, New York, has increased its capital stock from $25,000 to $75,000 and will add to its line of electrical novelties.

The Union & Crown Lumber Mills Corporation, North Hempstead, N. Y., has received a charter of incorporation with a capitalization of $2,000,000. M. Chandler and C. G. Armstrong, 149 Broadway, New York City, and F. L. Buckley, Vancouver, B. C., are the incorporators.

New England

BOSTON, MASS., October 20, 1914.

Large additions have been made to the total of machine-tool orders booked for foreign shipment. The Russian government has purchased several hundred 14, 16 and 18-in. engine lathes, and has inquiries out for a further large number. It is now expected that the United States will be completely depleted of these classes of machines. The more special lathes, those that have automatic features, are in equally great demand. These include the types recently contracted for by the Bethlehem Steel Company. Probably more of these lathes will be purchased in the near future. The demand for automatics of various descriptions is large, chiefly from abroad. They include screw machines which manufacture the smaller essential units of projectiles.

The manufacturers of the larger automatic turning machines are doing a prosperous business. The Potter & Johnston Company and Windsor Machine Company combination illustrates the point exceedingly well. The shops of both are busy to practically the limit. The Windsor Machine Company, Windsor, Vt., manufactures the Gridley automatic which takes bar stock up to the largest sizes. The company's very modern plant is running with full working force, on an overtime schedule. This means that nearly 600 men are employed more than 10 hours a day. The Potter & Johnston Company, Pawtucket, R. I., manufactures chucking machines. The works employ 600 men or thereabout, and additional hands are being taken on. One reason for the increased activity of these companies is that shipments of a large number of machines were held up at the outbreak of the war, and the shops suffered a period of stagnation. The release of what amounted to an embargo helped matters. But new orders have been the chief influence. While a large percentage of the new business booked by these companies is for foreign shipment, both note an improvement in the domestic demand. And this is the general experience in the trade. Dealers report that business is a trifle better.

Manufacturers of supplies and small tools state that the past week has shown improvement in domestic orders, chiefly from the automobile manufacturers. When questioned they assert that the new business is not to be connected with foreign orders for motor trucks now general among the large manufacturers of cars. The Eastern agricultural machinery establishments are very dull as is indicated by their orders placed in New England.

The builders of cylindrical grinding machines report a decided improvement in demand, especially in sizes which take the product of the smaller engine lathes. A large proportion of the new business is for foreign shipment.

The Brown & Sharpe Mfg. Company, Providence, R. I., has put several of its machine departments on a full time basis.

The two new factory buildings of the Spencer Wire Company, Worcester, Mass., work upon which has commenced, will give large additional space for manufacturing. Both will have three stories; one will be 60 x 230 ft., and the other 60 x 180 ft.

Charles W. Mullen, Bangor, Me., is planning the establishment of a paper and pulp mill at Mattaceunk, on the Penobscot River. The fulfillment of this enterprise would include the building of a section of railroad and the development of an important water power.

The Connecticut Agricultural College, Storrs, Conn., has received bids for a building which will be devoted to a new department to be known as the machinery school.

The McCallum Hosiery Company, Northampton, Mass., will erect a mill.

The Taunton Rubber Company, Taunton, Mass., will erect an additional building, 50 x 100 ft.

The new building of the Union Metallic Cartridge Company, Bridgeport, Conn., will be 64 x 288 ft., one story.

The American & British Mfg. Company, Bridgeport, Conn., will erect an additional building, to be 65 x 100 ft., for use as a mount shop.

Philadelphia

PHILADELPHIA, PA., October 19, 1914.

The A. Schoenhut Company, Adams and Sepviva streets, Philadelphia, has awarded the contract for the construction of a two-story brick boiler house and garage, to cost $13,000. The contract for the engine has been awarded to the Fitchburg Engine Company, Fitchburg, Mass. S. A. Jellett, Franklin Bank Building, Philadelphia, is the engineer.

The Counties Gas & Electric Company, Norristown, Pa., is erecting a pump house, two stories, of brick and concrete construction. Frank R. Heavener, Norristown, Pa., is the contractor.

Philadelphia will provide increased pumping facilities at its Torresdale and Wentz farm plants. Bids have been received covering materials and equipment costing $50,000.

Charles Bolton & Sons, Witherspoon Building, Philadelphia, have drawn plans for a two-story brick factory, 60 x 80 ft., to be erected at Thompson and Cumberland streets, Philadelphia, for the Abbott Estate, Broad and Race streets, at a cost of $7000.

The York Sanitary Milk Company, North George and Jefferson streets, York, Pa., is building a two-story brick and concrete factory, 60 ft. square, to cost $15,000. No equipment beyond present facilities is required, but the company desires information regarding special flooring adapted to its uses.

A. W. Arnold, 634 Washington street, Reading, Pa., is having plans prepared for a three-story factory, 37 x 100 ft., to cost $14,000. J. Earl Hickman, 119 South Fifth street, Reading, is the architect.

Theodore C. Auman, Reading, Pa., and others, have organized a company at York, Pa., to manufacture motor vehicles. The directors are H. R. Averill, E. T. Gillard, B. F. Posey, York, Pa.; H. and J. B. Rohrer, Lancaster, Pa., and T. C. Goodwin and Otto Schaeffer, Baltimore, Md.

A permit has been issued to James G. Doak & Co., Crozier Building, Philadelphia, Pa., covering the construction of a one-story power house, 67 x 88 ft., to be erected at Twentieth street and Oregon avenue, for the Girard Estate, Lafayette Building, Philadelphia.

The Waynesboro Power Lawn Mower Company, Waynesboro, Pa., has been incorporated by W. R. Snively, Daniel Rinehart and others to manufacture a patented power lawn mower. The machine will be produced under contract for the present; but it is the intention later to build and equip a factory. S. E. Beeler is general manager.

Detroit

DETROIT, MICH., October 19, 1914.

Definite improvement is apparent in the local machinery market. There has been an increase in orders for single tools, and this together with two or three orders for small groups of tools makes a fair showing for the week. Inquiries, too, are somewhat heavier and the general situation may be considered encouraging. Foreign business for the automobile manufacturers is markedly noticeable and it has had a stimulating effect not only on this industry but on almost all lines of automobile accessory manufacture. The foundry trade also is in better condition and plants generally are running on increased capacity. Building operations show little change in volume; but the tendency is toward improvement.

Dodge Brothers, Detroit, automobile manufacturers, have awarded contracts for the construction of a new unit to their present plant, etc. The new factory will be 75 x 400 ft., four stories, of reinforced concrete construction. It will be used partly for a pressed steel shop and considerable press equipment will probably be required. The improvements will represent an investment of $650,000.

The Cincinnati Precision Lathe Company, Detroit, has been incorporated with a capital stock of $12,500. Albert M. Fariner is the principal stockholder.

The Detroit Saw & Brazing Works, 12 Atwater street, Detroit, has been taken over by Claude Frazier, who has added several new lines and installed additional equipment and plans further additions.

The General Spring & Wire Company, Detroit, has been incorporated by Joseph H. Clark, August H. Peterson and Alfred H. Peterson with $10,000 capital stock to manufacture springs and wire goods.

The Won-Kote Enamel Company, Detroit, has been incorporated to manufacture enamels. It has established a plant at Ravenswood, Chicago, Ill. The general offices are at 903 Free Press Building, Detroit, with F. E. Spooner in charge.

The Western Electric Company, Detroit, has purchased the former plant of the Detroit Foundry Company from the Detroit Trust Company, receiver, and will remodel it for its own use.

The Enterprise Brass Company, brass founder, Muskegon Heights, Mich., has had plans prepared for a plant which will be erected either in Muskegon or Muskegon Heights this fall.

The Commonwealth Adding Machine Company, Muskegon, Mich., has been incorporated with a capital stock of $200,000 to manufacture adding machines. Negotiations are at present under way for a factory for which it is reported considerable equipment will be required. E. B. Dake, J. C. Thombrugh, Chicago, and W. E. Collier are among the principal stockholders.

The Seator Machine Mfg. Company, Battle Creek, Mich., has increased its capital stock from $50,000 to $100,000.

The Vegetable Parchment Company, Kalamazoo, Mich., will increase the capacity of its plant by the erection of an addition and the installation of more equipment.

The H. K. Beam Machine Company, Three Rivers, Mich., has been incorporated to take over the business formerly operated by Beam & Spaulding. Manufacturing facilities will be increased.

It is reported from Manistique, Mich., that Grief Brothers, Cleveland, will erect a cooperage plant in the former city.

The Detroit Gear & Machine Company, Detroit, Mich., has purchased the additional machinery required for its new building, but will be in the market from time to time for machine tools to round out its equipment. A. W. Copland is president.

The Universal Products Company, 518-520 Woodbridge street, East, Detroit, Mich., manufacturer of universal couplings, has been incorporated to manufacture universal joints of the ball-bearing type for automobiles. H. E. Jenkins, the vice-president, is now purchasing machinery which is to be installed in the former plant of the Brady-Nagel Mfg. Company. The principal requirement at present is for grinding machinery. Franklin V. Killian, 508 Thirteenth street, Washington, D. C., is president.

River Rouge, Mich., has authorized the bonding of the community for $34,500 for improving the present water and sewage system.

Cincinnati

CINCINNATI, OHIO, October 19, 1914.

It is difficult to estimate the total foreign business received here in the past 30 days. For obvious reasons many manufacturers are adverse to giving out information regarding shipments destined for any of the countries in Europe now at war. However, it is known that harness and saddlery companies have all they can do to fill some very large rush orders. In the machine-tool line, lathe makers have fared better than others, and in a few instances overtime has had to be resorted to in order to make shipments as required. It is understood that a number of milling machines have also been purchased lately, although some of this business originated from domestic sources. Manufacturers of auto-trucks and automobile parts have recently proved to be very good customers for machine-tool builders, and an increased demand is anticipated from this source, but business from the railroads and car manufacturing concerns is exceedingly quiet.

Considerable improvement is reported by several jobbing foundries. Manufacturers of small electrical equipment are also receiving more orders. It is understood that the glass factories in this territory are very busy, due to an absence of European competition.

The plant of the Donaldson Art Sign Company, Ninth and Sycamore streets, Cincinnati, was badly damaged by fire October 13. The loss is estimated at $75,000. Arrangements for refitting the factory will be made at once.

The National Automatic Typewriter Company, Hamilton, Ohio, which has perfected a new typewriter attachment, has made a contract for its manufacture with the Hooven, Owens, Rentschler Company, Hamilton.

The Dayton Tool & Die Company, Dayton, Ohio, has changed its name to the Precision Tool & Instrument Company.

A site has been obtained by the city of Dayton, on which a garbage reduction plant will be erected. The equipment has not yet been purchased.

The Champion Carbon Company, Carew Building, Cincinnati, is reported to have completed plans for a three-story building to be erected at Coveland, Ohio.

The Lancaster Paper Mill Company, Lancaster, Ohio, is installing machinery in its new plant at that point. Mention of this project was made several weeks ago.

The Royal Printing Machinery Company, Springfield, Ohio, has been incorporated with $100,000 capital stock by E. O. Cartwright and others. Nothing is known as to manufacturing plans.

Wellsville, Ohio, will soon call for bids on equipment needed for a municipal lighting plant. The proposed plant is estimated to cost $60,000.

The Spencer Mfg. Company, Spencer, Ohio, has been incorporated with $50,000 capital stock. It is reported that it will erect a plant for manufacturing automobiles. C. R. Aldrich and J. J. Christy are named among the incorporators.

Indianapolis

INDIANAPOLIS, IND., October 19, 1914.

The Electric Metals Company, Indianapolis, has been incorporated with $10,000 capital stock to manufacture electric furnaces, castings, rolled and forged shapes, etc. The directors are H. H. Buckman, Jr., George A. Pritchard and M. R. Buckman.

The American Wood Products Company, Indianapolis, has been incorporated with $100,000 capital stock by R. B. and J. D. Wilson and N. M. Eckler to manufacture wood products.

The Doddridge-Beck Detachable Handle Company, Indianapolis, has been incorporated with $25,000 capital stock to manufacture detachable handles. J. C. Beck, J. F. Ankenbrock and G. J. Myers are the incorporators.

The circuit court at Indianapolis has appointed the Fletcher Savings & Trust Company receiver for the Premier Motor Car Mfg. Company, on application of the American Foundry Company.

The Midland Mirror Company, Evansville, Ind., has been incorporated by William J. McGurk and others for the manufacture of mirror plates for furniture. It is building a factory, three stories, of brick construction, to be in operation by November 1.

Ft. Wayne, Ind., will soon call for bids for installing a set of lift pumps at its Lakeside sewer station.

The Montezuma Brick Works, Montezuma, Ind., have been incorporated with $200,000 capital stock to manufacture brick and other clay products. The directors are R. H. Lanyon, W. D. McIlvaine and Robert Cousin.

The Imperial Electrical Company, Union City, Ind., has been incorporated with $10,000 capital stock by Ray H. Garver, Richard H. Garver and W. S. Buchanan to manufacture electrical devices.

The American Playground Device & Swing Company has increased its capital stock from $20,000 to $50,000 and has moved its plant and headquarters from Terre Haute and Indianapolis to Anderson, Ind.

The Mecca Waterworks Company, Mecca, Ind., has been incorporated with $10,000 capital stock to supply water, light and heat. A. Hixon, H. E. Jones and E. Vestal are the incorporators.

The Sieffert Electric Company, Evansville, Ind., has increased its capital stock from $10,000 to $20,000.

The National Pin & Bracket Company, North Vernon, Ind., has let the contract for a building 30 x 70 ft.

The Huntington Boom Fund Association, Huntington, Ind., has obtained two industries for the city, having signed contracts with the United States Needle Company, Minneapolis, Minn., and the Shasta Machinery Company, Chicago, Ill.

The Richmond Electric Company, Richmond, Ind., has been incorporated with $10,000 capital stock to manufacture and deal in electrical supplies. The directors are W. M. Bailey, C. T. Wiley and E. M. Anderson.

Cleveland

CLEVELAND, OHIO, October 19, 1914.

Business with dealers appears to show some improvement. Quite a few single tool orders are coming out and there is a fair volume of new inquiry for single and small lots of machines for use in small manufacturing plants and in garage repair shops. A new inquiry for 14 standard machines has come from an Ohio manufacturer of automobile parts and accessories. These include lathes, milling machines and shapers. Conditions with machine-tool builders continue rather quiet. Some foreign sales are being made in small lots. Forge shops report an improved demand from builders of traction engines and other consumers outside of the automobile field. In the foundry trade a few plants are slightly busier but most foundries, both those that do a

general jobbing work and those that specialize on automobile work, are running at about 50 per cent. of capacity.

A new foundry, 80 x 105 ft., of brick and steel construction, is being erected at 6601 Morgan avenue, Cleveland, by E. Hribal. It will be provided with two cupolas of 6 and 8-ton capacity and will start in operation about December 1.

Sealed bids will be received by the commissioner of purchases, Cleveland, October 30, for sub-station transformers for the municipal electric light plant.

The Hoffman Heater Company, Lorain, Ohio, will shortly increase its capital stock to $100,000 and will probably enlarge its manufacturing facilities.

The Standard Motor Truck Company, Warren, Ohio, has purchased a portion of the plant of the Day-Ward Company in that city. The purchase includes two buildings, which will be fitted up for the manufacture of motor trucks.

The Delaware Foundry & Machine Company, Delaware, Ohio, has placed contracts for the erection of its new plant, 60 x 140 ft., with a wing 18 x 30 ft.

Milwaukee

MILWAUKEE, WIS., October 19, 1914.

It is the consensus of opinion among machinery builders that events of the last ten days or more indicate a gradual restoration of confidence which must develop actual improvement in business before long. The more optimistic interests prophecy developments in 60 to 90 days. Allis-Chalmers, Nordberg, Vilter and other important machinery interests are booking excellent business at this time and figuring on a considerable volume that will develop about January 1. A $260,000 order for waterworks equipment for the city of Cleveland is one of the large Allis-Chalmers bookings in the past few days. Milwaukee and Wisconsin motor truck builders have received a quantity of foreign business. Industrial extensions are being resumed in cities throughout the State, opening the way for new tool and power plant equipment.

The Spring City Foundry Company, Waukesha, Wis., a large producer of automobile cylinder castings, farm implement parts and other similar articles, is making plans for doubling the size of its plant. A one-story addition, 60 x 112 ft., will be erected at once.

The Allis-Chalmers Mfg. Company and other Milwaukee electrical equipment manufacturers are figuring on specifications filed with the Milwaukee Merchants' & Manufacturers' Association by the city of Port Elizabeth, South Africa, for a complete electric light plant.

The Racine File Company, Racine, Wis., has been sold to Ernest Anheuser, Racine, Wis.

The Modern Stamping & Mfg. Company, Milwaukee, has been incorporated by A. C. Jorgenson and J. B. Foley, Milwaukee, to manufacture die castings, stampings, etc. The capital stock is $150,000 and H. F. Friedrich is attorney.

Bids for the construction of the first unit of the $1,000,000 Home for Feeble Minded at Union Grove, Wis., costing $250,000, including the power and heating plant, etc., will be taken in about 60 days by the State Board of Control, Madison, Wis. Robt. A. Messmer & Bro., Majestic Building, Milwaukee, are the architects, and Vaughan, Meyer & Sweet, Milwaukee, are the engineers.

A $7500 cold storage plant will be established at the Iowa County insane asylum and poor farm near Dodgeville, Wis. O. G. Rewey is in charge.

The Racine Rubber Company, Racine, Wis., tires and commercial rubber goods, has increased its capital stock to $1,500,000 to accommodate its rapidly growing business. No considerable purchases of new equipment will be made, nor are there any extensions in prospect, but from time to time small lists of machinery and forms are bought for replacement or increasing certain facilities. George B. Wilson is president.

The Badger-Packard Machinery Company, Milwaukee, bid in the entire machinery and equipment of the defunct Piggins Brothers Company, Racine, Wis., at auction last week. The Piggins Company manufactured motor trucks and vehicles and is said to have repurchased enough of the equipment to make it possible to resume operations within a few weeks. New capital has been secured. The manufacture of motor trucks will again be undertaken.

The plant of the Dornfeld-Kunert Company, Watertown, Wis., adjudicated bankrupt September 12, will resume operations by November 1, according to A. F. Baumann, the trustee. This action is taken so that uncompleted contracts may be finished.

Ray Anderson and Robert Dixon, West Ellis, Wis., have organized a partnership under the style of Reliance Garage Company to lease and operate the new garage and repair shop now under construction for W. F. Tubesing, Matthews Building, Milwaukee.

Schleisingerville, Wis., has voted $6000 of bonds for a municipal electric light system.

Shawano, Wis., plans to erect a water power plant to develop 400 hp. and to install an engine of about 300 hp. P. E. Caprano is superintendent.

St. Louis

ST. LOUIS, MO., October 19, 1914.

The machine-tool market is gradually assuming a more favorable aspect. While no large increase in business has occurred, each week shows a gain. The definite development of the $150,000,000 cotton loan pool has put considerable backbone into the cotton section. There have been some tentative inquiries in the market the past week and a few purchases, but nothing of large amount so far. Dealers continue to be optimistic as to the ultimate outcome. General business is reported improving and there are even instances in general lines of gains over last year. Money is perceptibly easier. Collections are reported good, considering the difficulties of the situation.

The Columbia Can Company, St. Louis, suffered serious damage to its plant by fire October 14 and will, it is stated, require some additional equipment for replacement.

The Ludlow-Saylor Wire Company, St. Louis, has, by permission of the secretary of state of Missouri, extended its corporate existence for 50 years from January 31, 1915.

The International Mfg. Corporation, St. Louis, recently organized to manufacture gas machinery, will open bids December 1 for about $20,000 of equipment. S. L. Wagley, Box 531, Ft. Worth, Texas, or 2008 St. Charles street, St. Louis, Mo., should be addressed.

The Canton Planing Mill Company, Canton, Mo., has been incorporated with a capital stock of $18,000 by E. M. Carson, C. C. Clay and W. T. Graves.

The Jopes & Jones Hot Blast Smelter Mfg. Company, Kansas City, Mo., has been incorporated with a capital stock of $50,000 by J. V. Cowles, W. A. McGowan and C. T. Jopes and will establish a plant.

The Pacific Refrigerating Company, Pacific, Mo., has been incorporated with a capital stock of $30,000 by W. A. Powers, James Booth and J. W. Morrill and will install a plant.

Smithville, Mo., has voted to equip an electric light plant and distribution system. The mayor should be addressed.

The Burdett Mfg. Company, Kansas City, Mo., C. S. Van Noy, president, 1404 East Nineteenth street, will install about $30,000 of equipment for the manufacture of mop yarns and similar products.

Opet & Torbett, Springfield, Mo., are in the market for electric equipment, sprinkler system, elevators and steam heating equipment for a $200,000 commercial and office building.

The board of supply, Elsberry, Mo., will receive bids until 1 p. m., October 24, for a steam-driven pumping plant.

A feed mill to cost about $50,000 will be established at East St. Louis, Ill., by H. C. Joehnk and others of the Champion Feed Milling Company, Lyons, Iowa. It will have a capacity of 20 tons per hour.

The Orvil Light, Power & Water Company, Hartsburg, Ill., has been incorporated with a capital stock of $14,000 by D. H. Van Gerpen, J. H. Butler and G. A. Shirley and will establish a public service station requiring electric and pumping machinery.

Kiefer, Okla., sold $35,000 of waterworks bonds October 17.

The Chelsea Refining Company, Chelsea, Okla., will build a pumping station, etc., at Ardmore, Okla.

The Milliken Pipe Line Company, Cushing, Okla., incorporated with a capital stock of $300,000 by John T. Milliken and C. L. Painter, St. Louis, and William C. Newell, Tulsa, Okla., will equip a pumping station and pipe line with about 12,000 bbl. daily capacity.

The Coahoma Drainage District, E. L. Fontaine, engineer, Clarksdale, Miss., will equip to drain about 18,000 acres of swamp land, expending about $65,000 on ditching and pumping equipment combined.

The Southern Lumber & Ice Company, Hattiesburg, Miss., will build a cold storage plant and increase the ice-making capacity to 100 tons daily. Gilbert Gilman is in charge.

The Delta Mfg. Company, Greenwood, Miss., has been incorporated with a capital stock of $100,000 by S. L. Rainey, H. A. Minor, W. G. McIntyre and others.

The Faultless Incubator Company, Grove, Okla., has been incorporated with a capital stock of $15,000 by A. Sullwold, H. E. Dixon and John T. Oakley and will equip a plant requiring both metal and woodworking machinery.

Gulfport, Miss., will expend about $8000 on additional equipment for its waterworks plant. Hobart D. Shaw is city engineer.

The Mississippi Agricultural & Mechanical College, Agricultural College, Miss., of which William A. Giles is superintendent, is in the market for equipment for instruction in manual training, etc.

J. W. Renshaw, Coffeeville, Miss., has plans for a hydro-electric power plant. He is reported in the market for equipment.

Mansfield, La., will receive bids until November 3 for pumping machinery for its water plant. L. E. Colvin is clerk.

The Orleans-Kenner Electric Interurban Railway, New Orleans, La., of which Harry K. Johnson is president, has placed $250,000 worth of bonds and is now in the market, it is stated, for generating equipment for a power house.

The Central South

LOUISVILLE, KY., October 19, 1914.

Business is reported to be rather irregular, some concerns getting a fair number of orders and others finding trade very slow. Although conditions in the cotton-growing section are generally below grade, certain houses are drawing almost a normal proportion of business from that territory. The volume of trade in most cases is lighter than normal, but cheerful expressions are generally given regarding prospects. Practically every machinery manufacturer of any importance in this territory is developing all the available information regarding export prospects; but, as far as has been learned, few regard the present as favorable to getting orders in South America, and a watchful waiting policy has therefore been adopted.

E. D. Morton & Co., Louisville, machinery dealers, report the sale of a crank shaper of the Smith Mills Company, Cincinnati, to the P. Bannon Sewer Pipe Company, Louisville.

The Louisville Anzeiger, Louisville, will probably require a considerable horsepower in alternating current motors.

The Louisville office of Fairbanks, Morse & Co. has sold two 25-hp. crude oil engines to the Western Kentucky Petroleum Company, Louisville, for installation at Hartford, Ky.

The American Machine Company, Louisville, has been making a number of improvements in its plant. It has recently installed a worm milling machine of Schuchardt & Shütte, a LeBlond universal grinder, two Gardner disk grinders and a Toledo trip hammer.

The Louisville Chemical Company, 108 South Third street, Louisville, will purchase a small boiler, engine, motor, electric freight elevator, and special equipment.

The Grocers' Biscuit Company, Louisville, will purchase five or six motors, ranging up to 15 hp., in addition to special machinery J. William Miller is president.

M. H. Singer, Harrodsburg, Ky., will require low-pressure boilers for heating purposes.

Mowbray & Robinson, Cincinnati, O., lumber manufacturers, have decided to establish a flooring factory at Quicksand, Ky. The building will be 72 x 372 ft., and will be equipped with crosscut and ripsaws, planers, conveyors, etc.

Jack Hitner, Paducah, Ky., machinist, plans to manufacture a patented automatic railroad switch.

W. E. Hunter, who recently purchased a waterworks franchise at Providence, Ky., has announced that a 30-ton ice plant will also be erected by the company which he has organized.

The Chesapeake & Ohio Railroad, Richmond, Va., has announced that it will start to build its machine shops at Lexington, Ky., next spring.

The Tennessee Milling Company, Chattanooga, Tenn., has been incorporated with $200,000 capital stock and will construct a flour mill. R. J. Riddle, D. T. Riddle and D. T. Riddle, Jr., are among the incorporators.

The Chattanooga Gas & Coal Products Company, Chattanooga, Tenn., which has begun the construction of its large coke and by-products plant at Chattanooga, has announced that $100,000 will be spent for machinery, and that installation will be arranged for in the immediate future. W. M. Ditto is chief engineer and Lewis T. Wolle is president. Thirty ovens of the Roberts-Moss type will be installed.

The Hatcher Broom Company, Memphis, Tenn., is in the market for a 4-hp. gas engine for Birmingham, Ala.

The Sylvan Cotton Mills, Shelbyville, Tenn., will increase the capacity of its spinning plant. Transmission equipment will be needed.

The Crystal City Amusement Company, Chattanooga, Tenn., will install a water system.

The Walsh & Weidner Boiler Company, Chattanooga, Tenn., reports the sale of a large battery of boilers to the Delta Land & Timber Company, Conroe, Tex. Sixteen cars were required to handle the shipment.

Birmingham

BIRMINGHAM, ALA., October 19, 1914.

Machinery repair shops report a fair demand for second-hand boilers, engines and pumps. The mines continue to take an approximately normal amount of machine tools. The inquiry from the lumber field is picking up under what is understood to be a tendency to look for better conditions in the export trade. Actual business, however, has scarcely improved. The extremely low price of cotton exerts an unfavorable influence.

The Polar Ice Company, Anniston, Ala., has completed plans for enlarging its factory to 200 tons daily capacity.

The Reid Lumber Company, Birmingham, Ala., is completing a sawmill at Sawyerville, Ala., with a capacity of 50,000 ft. a day.

G. Ober Sons & Co., Baltimore, have begun the construction of a fertilizer factory at Savannah, Ga.

R. J. Gornett, La Fayette, Fla., plans the establishment of a factory for the manufacture of a patented riding plow.

The Lookout Bending Company, Rossville, Ga., has been incorporated by F. C. Baumgartner, E. Zahnd, and others, with a capital stock of $15,000 to manufacture staves and spokes.

It is reported that the Tampa & Gulf Coast Railway will build general shops, including roundhouse, blacksmith and car repair shop at St. Petersburg, Fla. C. H. Lutz, Odessa, Fla., is general manager.

Westminster, S. C., has voted $16,000 of bonds for a municipal electric light plant.

The board of public works, Mullins, S. C., will receive bids until 4 p.m. October 29, for the construction of an electric and gasoline pumping station.

Texas

AUSTIN, TEXAS, October 17, 1914.

The machinery and tool trade is dull. Interest centers in the effort to establish cotton mills here. If the present widespread agitation in Texas brings results there will be a considerable number in the next few months. Plans are on foot in a dozen or more towns to establish industries of this character. In Terrell, Dallas, Irving, San Antonio, Austin, Gonzales, Cuero, Gainesville, and other towns, local investors show a readiness to subscribe for stock in the different companies that are to be organized to construct the mills.

The board of city commissioners, Dallas, Texas, has passed an ordinance providing for the sale of $50,000 of sewer bonds, previously authorized by election.

W. L. Hargis, Cotulla, will construct an irrigation pumping plant.

George W. Carpenter, Deming, N. M., and associates, are promoting the construction of a plant for manufacturing threshing machines.

The Farmers' Gin Company, Alto, will construct a cotton gin. H. H. Berryman is one of the principals.

Federico Montes, governor of the state of Queretaro, Mexico, is having plans prepared for the construction of a system of electric railways for the city of Queretaro, including a power plant.

The City Council, Ennis, will soon award contracts for the construction of a waterworks system. Bonds for the purpose have been issued.

The Wichita Falls Waterworks Company, Wichita, is making provision for adding to the town water supply system.

San Francisco

SAN FRANCISCO, CAL., October 13, 1914.

The local machinery trade shows little of an encouraging nature. A slight acceleration noted last month in machine tools and shop equipment has not been maintained, and, while about the usual amount of figuring is being done, practically no business results. In several other prominent lines, such as wood-working and contractors' machinery, a similar condition prevails. Mine operators are taking a little more interest, and some business is going through, although most contemplated improvements are delayed by lack of capital. The implement business, though not yet well under way, is expected to be large. A good many scat-

tering orders are being placed in connection with land improvements, packing establishments, etc., as well as for special equipment for the manufacture of goods that can no longer be readily imported. The only important work under way in the oil industry is that of the Dutch Shell Company, which last week closed an option in this city with a cash payment of $1,400,000.

The city of Oakland has taken figures on a small lot of tools and foundry equipment for the manual training school.

Lawrence Gardella, Oroville, Cal., is starting work on a new gold dredge near Lincoln, Cal.

Plans are under way for a plant for the Pacific Chemical Company, Agnew, Cal. A steel frame factory, tower and warehouse building will be built, and a large amount of special machinery will be installed.

R. B. Will, Sacramento, Cal., and others, are preparing to engage in the manufacture of crude oil burners and vacuum cleaning machines.

The Griffin Car Wheel Company's new plant at Los Angeles started operations October 5.

The stockholders of the Alameda Sugar Company, San Francisco, have decided to operate their beet sugar plant next year. It is estimated that an expenditure of $25,000 will be necessary to equip it.

The Mineral King Fruit Company, Visalia, Cal., is preparing to make numerous improvements, including a conveyor system, boiler and engines and miscellaneous packing house equipment.

The San Gorgonio Development Company, Los Angeles, is beginning work on two hydroelectric projects near Riverside. One will develop 3000 and the other 2000 hp.

The Port of Seattle, Wash., has placed an order with the San Francisco office of Manning, Maxwell & Moore for a large lumber handling crane for one of the new wharves.

The Schweitzer Machine Company, Tucson, Ariz., has just completed the construction of its new plant. A specialty will be made of irrigation and pumping equipment and general repair work. The shop covers an area of 100 x 125 ft., and is fully equipped.

Bids will be opened October 27 for a number of sugar conveyors for the wharf at Hilo, Hawaiian Territory.

The Pacific Northwest

SEATTLE, WASH., October 13, 1914.

The machinery men are looking forward to a good business in agricultural equipment, due to the excellent crops now matured. The recent reduction in freight rates on canned salmon to meet the water haul competition will do much, according to local brokers, to stimulate business in this industry. Already many of the canneries are making preparations to enlarge their plants to care for this new Eastern business. The machinery trade, in general, is still quiet, although there is a slight improvement noted in the market and it is believed this is largely due to the shipping facilities afforded by the Panama Canal. Tool orders are few and the bulk of business has been afforded by cannery machinery, a number of small sawmills and unusually active building operations.

The Portland Oxygen & Hydrogen Company, Portland, Ore., will construct a one-story factory and large steel tank at Seventeenth avenue at a cost of about $6000. W. C. Moore, Portland, has been awarded the contract.

The plant of the Morton Mill & Supply Company, Morton, Wash., owned by D. M. Smith, will be moved to a new site and additions and extensions made.

O. E. Neintz, care of the Pacific Iron Works, Portland, Ore., will build at East Twenty-ninth and Halsey streets a machine shop to cost $7500 and an iron foundry costing about $10,000. The machinery has not yet been purchased.

The Western Hardwood Mill Company, Highland Valley, Wash., will move its sawmill to Morton, Wash., and will make some extensions to it.

The plant of the Holt Machine Mfg. Company, manufacturer of harvesters and motor machinery, Spokane, Wash., was damaged by fire recently with a loss of $100,000 to buildings and contents. A large amount of valuable machinery was destroyed. H. B. Kershaw, the manager, states that the plant will be rebuilt immediately.

Work of rebuilding the plant of the Pelican Bay Lumber Company, Klamath Falls, Ore., which was destroyed by fire recently with a loss of $90,000, has been started. The company will rebuild on a much larger scale. F. Hill Hunter, Spokane, has charge of the work.

The pumping plant and garage of Frank Sloan, Stanfield, Ore., which was destroyed by fire with a loss of about $2500, will be rebuilt.

The North Lake Canal Company, Roberts, Idaho, has filed articles of incorporation and will irrigate a tract of 30,000 acres, installing a pumping plant. Bids for machinery required will be called for soon.

Eastern Canada

TORONTO, ONT., October 19, 1914.

The Hamilton By-product Coke Ovens Company, Ltd., Hamilton, Ont., recently reported as about to start construction of a plant, will not have completed plans until about January 1. Construction will be commenced next spring. T. V. Byrnes is president. The proposed cost will be $2,000,000.

The Gibson Furniture Company, Mt. Forest, Ont., is purchasing wood-working machinery.

The Hawkesbury Board & Paper Mills, Hawkesbury, Ont., will commence construction on a paper board mill. T. E. Helmick, 40 Herald Building, Montreal, is one of the principals.

The ratepayers of Chatham, Ont., passed a by-law to grant $2000 for the purchase of a site for the proposed plant of the Canadian Concrete Products Company.

It is understood that the facilities of the factory of the Ross Rifle Company, Quebec, Que., have been greatly enlarged by the addition of new machinery, as a result of which the output will be increased. It is not improbable that it will be further enlarged as soon as practicable.

The Three Rivers, Que., plant of the Modern Joint Foundry Company, Montreal, was totally destroyed by fire.

The City Council, Montreal, has voted $100,000 for the construction of waterworks this year. L. N. Senechal is secretary of the council and Mr. Clarkson, 1009 New Birks Building, is the engineer.

The Galt Ornamental Iron Company, Galt, Ont., has purchased a factory and will not build at present.

The International Fire Works Company of Canada will erect a factory at London Junction, Ont.

Bids will be called by the City Council, London, Ont., for two direct-current motor generator sets, 1500 volts, complete with switches, etc. H. J. Glaubitz is the city engineer.

The Beachburg Milling Company, Ltd., Pembroke, Ont., has been incorporated with a capital stock of $40,000 by W. D. Dewar, Albert Gould, J. P. Miller, and others.

His Master's Voice, Ltd., Toronto, has been incorporated with a capital stock of $100,000 by J. S. Lovell, William Bain, Robert Gowans, and others, to manufacture talking machines, etc.

The Penberthy Construction Company, Ltd., Toronto, has been incorporated with a capital stock of $60,000 by W. R. Mather, A. J. Penberthy, James Parker, and others.

The Royal City Match Company, Ltd., Guelph, Ont., has been incorporated with a capital stock of $100,000 by A. W. Briggs, Arthur Beaumont, H. E. Grosch, and others, to manufacture matches.

The Rubberset Company, Ltd., Toronto, has been incorporated with a capital stock of $40,000 by J. W. Pickup, James Aitchison, Duncan, McArthur, and others, to manufacture rubber goods.

The American LaFrance Fire Engine Company of Canada, Ltd., Toronto, has been incorporated with a capital stock of $50,000 by Harry Riley, William R. Anderson, Thomas S. H. Giles, and others.

The Canada Auto-Pneumatic Pump & Machinery Company, Ltd., Summerside, P. E. I., has been incorporated with a capital stock of $35,000 by J. A. Van Tilburg, F. A. Johnston, D A. Pickering, and others.

The Canadian Shipbuilding & Dry Dock Company, Ltd., Owen Sound, Ont., has been incorporated with a capital stock of $2,000,000 to manufacture iron, steel and other metals, to construct and operate drydocks, to build ships, etc. The municipality of Owen Sound, Ont., will grant a subsidy to the company which amounts to a cash bonus of $10,000 a year for 20 years. A site has been selected on the bay shore of the city. The dock is to be 775 ft. long, 104 ft. wide, and 21 ft. over the sills. E. D. Pitt, who is in charge, announces that the plans are being filed and that the plant will be the largest and most complete for shipbuilding and repairs on the Great Lakes. Among the stockholders are F. F. Wood and E. D. Pitt, Niagara Falls, Ont.; F. J. Nelson and John Roche, Buffalo, N. Y.

The Calorigine of Ottawa, Ltd., Ottawa, Ont., has been incorporated with a capital stock of $50,000 by Bernardine Boutet, A. Belanger, Edgar Boutet, and others, to manufacture peat stoves and other heating apparatus.

The Vacuum Freezers, Ltd., Toronto, Ont., has been incorporated with a capital stock of $50,000 by Charles M. Preston, W. H. Harding, H. J. Clarke, and others, to manufacture vacuum ice cream freezers.

The Lewis Hardwood Company, Ltd., Lewiston, N. S., has been incorporated with a capital stock of $50,000 by G. E. M. Lewis, Bowmanville, Maine; C. H. Anderssen, Lewiston, N. S., and others, to manufacture wood, lumber, etc.

The MacLeod Paper Company, Ltd., Halifax, N. S., has been incorporated with a capital stock of $200,000 to manufacture pulp and paper.

The Harrison Machine & Motor Works, Ltd., Dartmouth, N. S., has been incorporated with a capital stock of $10,000 to manufacture motors and other machinery.

Thomas & Robertson, St. Thomas, Ont., is erecting a broom factory at Ingersoll, Ont.

The St. Lawrence Pulp & Lumber Corporation, Chandler, Que., is making rapid progress with the construction of its pulp and saw mills.

J. P. O'Shea & Co., Ltd., Montreal, Que., is making additions to its factory to cost $50,000.

The W. T. Harris & Son, Ltd., Halifax, N. S., has been incorporated with a capital stock of $20,000 to manufacture machinery, etc.

The A. E. Rea Drug Company, Ltd., Ottawa, Ont., has been incorporated with a capital stock of $50,000 by Thomas F. Carrie, Toronto, Lefebvre Brownhill, G. E. Clapin, and others, to manufacture surgical instruments, etc.

The Canadian-American Graphite Company, Ltd., Prescott, Ont., has been incorporated with a capital stock of $250,000 by Charles Keeler, G. A. Drummond, W. H. Stephenson, and others, of Prescott, Ont., to treat ores, metals, minerals, etc.

Western Canada

WINNIPEG, MAN., October 14, 1914.

The Grand Brook Marble Company, Ltd., Edmonton, Alberta, has been incorporated with a capital stock of $30,000 to manufacture marble, etc.

The Easterbrook Milling Company, Ltd., Richmond, B. C., has been incorporated with a capital stock of $30,000 to manufacture flour, feed, etc.

President Chamberlain of the Grand Trunk Railway Company states that it will build one of the largest drydocks in this country at Prince Rupert, B. C. Work will be started January 1. R. H. Safford, Montreal, is chief engineer.

The Salmon River Lumber & Shingle Company, Ltd., 198 Hasting street, Vancouver, B. C., will rebuild its plant at New Westminster, B. C., recently destroyed by fire. The new plant will cost $40,000.

Rockwell, Theal & Davidson, Cilliwack, B. C., have had plans drawn by N. J. Hall, Vancouver, B. C., for a grain elevator to be of mill and corrugated iron construction. W. H. Davison, North Vancouver, B. C., is the building superintendent.

Government Purchases

WASHINGTON, D. C., October 19, 1914.

The Bureau of Yards and Docks, Navy Department, Washington, will receive sealed proposals until 11 a.m., November 21, for furnishing and installing a refrigerating plant complete for the U. S. navy yard, Mare Island.

Bids were received at the Bureau of Supplies and Accounts, Navy Department, Washington, October 13, for supplies for the navy yards, as follows:

Schedule 7291, Steam Engineering

Class 1, Brooklyn—One ice-making machine and accessories—Bid 7, $18,507.85; 34, $31,300, $32,300, $32,800, $25,300, $26,300 and $26,800; 92, $22,743.53; 184, $18,900.

Schedule 7301, Construction and Repair

Class 11, Mare Island—Eight convertible type motor-driven fans—Bid 174, $118.

Alternate—Same, f.o.b. works—Bid 174, $114.

Schedule 7339, Construction and Repair

Class 91, Norfolk—One double surfacing machine—Bid 11, $2755.24, $2210.50 and $2037.22; 59, $2198; 206, $2297.

The names of the bidders and the numbers under which they are designated in the above list, are as follows:

7, American Carbonic Machinery Company; 11, Berlin Machine Works; 34, Clothel Company; 59, J. A. Fay & Egan Company; 92, Krochell Brothers Ice Machine Company; 174, B. F. Sturtevant Company; 184, The Vilter Mfg. Company; 206, American Woodworking Machinery Company.

Judicial Decisions

ABSTRACTED BY A. L. H. STREET

WARRANTY OF EFFICIENCY OF DREDGE.—A company which contracted to manufacture a dredge to be used in deepening a harbor, having constructed a dredge conforming to the plans and specifications agreed upon, and conforming to a warranty that it would move a given quantity of dredgable matter of a specified kind a certain distance, cannot be deemed to have warranted that the dredge was suited to the purpose for which it was bought, and the buyer cannot vary the terms of the written contract by showing that there was a concurrent oral warranty on the latter point. (California Supreme Court, United Iron Works vs. Outer Harbor Dock & Wharf Company, 141 Pacific Reporter 917.)

STATEMENTS WHICH ARE NOT WARRANTIES.—Mere representations by a salesman that certain goods will prove to be salable and that certain profits will be secured by the buyer, being merely opinionative, cannot be regarded as such warranty as entitles the buyer to rescind the contract on discovering the untruth of the statements. (Georgia Court of Appeals, Walker vs. Story, 82 Southeastern Reporter 355.)

VALIDITY OF CONDITIONAL SALE CONTRACTS IN OREGON.—Recording of a conditional sale contract made in Oregon is not essential to its validity. It need not even be reduced to writing in a case where a verbal bill of sale would be good. (United States Circuit Court of Appeals, Ninth Circuit, Meier & Frank Company vs. Sabin, 214 Federal Reporter 231.)

INJURY CAUSED BY DEFECTIVE MACHINE.—That attempt was made to repair a defective machine used by an employee cannot be deemed to deprive the employer of notice of a defective condition remaining on account of insufficiency of the repair. It is no defense to suit for injury to an employee while operating a defective iron stamping machine that he could have safely used sticks in handling iron sheets, instead of his hands, if the employer had not provided sticks, although the injured worker might easily have procured sticks for himself. (Springfield Court of Appeals, Shimp vs. Woods-Evertz Stove Company, 168 Southwestern Reporter 811.)

IMPLIED WARRANTY OF MACHINERY.—The rule of law that a buyer of goods, having inspected them, takes them with their defects does not apply to a sale of a machine newly placed upon the market by the manufacturer, as against a defect which is latent and not discoverable on examination, and which renders the machine unsuitable for the purposes for which it was manufactured. (Oklahoma Supreme Court, Standard Sewing Machine Company vs. New State Shirt & Overall Mfg. Company, 141 Pacific Reporter 1111.)

TELEGRAPH COMPANY'S LIABILITY.—A telegraph company is liable to both the sender and the addressee of a telegram ordering goods for damages resulting from a negligent mistake made in transmitting the message, whereby the order is made to call for a different class of goods. In this case the order called for machinery of certain dimensions, but was negligently changed so as to call for much larger machinery, the mistake not being discovered until arrival of the shipment. But a party who is aggrieved by such a mistake must, on discovering it, take all reasonable steps to minimize the loss resulting from the mistake. By obtaining from the addressee an assignment of his right of action on account of the mistake, the sender may enforce a claim against the telegraph company for the total loss sustained by both. (Alabama Supreme Court, Jackson Lumber Company vs. Western Union Telegraph Company, 65 Southern Reporter 962.)

WAIVER BY SELLER OF CASH PAYMENT.—Although goods be sold for cash on delivery, the seller will not be permitted to reclaim them on the ground of non-payment, if unreasonable time for payment is permitted to elapse. So, where a seller of metal to an iron works company for cash made several successive deliveries without receiving payment, the metal could not be reclaimed on the eve of the company's bankruptcy. (United States Circuit Court of Appeals, Sixth Circuit, Cincinnati Railway Supply Company vs. Hartlieb, 214 Federal Reporter 177.)

Trade Publications

Milling Machines.—Kearney & Trecker Company, Milwaukee, Wis. Catalogue No. 19. Shows in detail the construction of a line of milling machines and their various special features, the text being supplemented by numerous halftone engravings. This description occupies 43 of the 86 pages of the catalogue, and the remainder is given over to illustrations of the completed machines, with dimension diagrams and tables and brief descriptions and illustrations of the tools that are furnished with the machines. An illustrated description of the company's constant-speed machine appeared in *The Iron Age*, June 5, 1913.

Forges, Blowers and Tire and Axle Upsetting and Welding Machines.—D. H. Potts, Lancaster, Pa. Catalogue. Size, 4 x 5¾ in.; pages, 96. Contains illustrations and brief descriptions of various kinds of forges, blowers and tire and axle upsetting and welding machines. In connection with the illustrations of the various forges, brief statements are given of the work for which they are adapted, tables of dimensions of the blowers are included and mention is made of a line of drilling machines for mounting on posts. An index of the various lines covered is included.

Multiple Strainers.—Lagonda Mfg. Company, Springfield, Ohio. Catalogue R-2. Describes a line of multiple water strainers for the intake lines of power plants and pumping stations. These strainers are of the multiple straining basket type which can be cleaned readily, without interrupting the flow of water. An illustrated description of a large strainer of this type appeared in *The Iron Age*, October 31, 1912.

Shearing Machines.—Canton Foundry & Machine Company, Canton, Ohio. Catalogue. Gives a brief description of the special features of a double-geared line of alligator shearing machines, followed by illustrations of the various machines, with condensed specification tables. These machines are arranged for independent or motor drive, the power in each case being transmitted by a belt to the flywheel and from there through gearing. The machines are built in both the continuous and stop motion styles, with high or low knives. Mention is also made of a portable machine having motor drive.

Transmission Machinery.—Tranter Mfg. Company, Pittsburgh, Pa. Catalogue No. 2, superseding all previous issues. Describes and illustrates a line of appliances for the transmission of power, including shafting, couplings of various kinds, collars, drop hangers and floor stands, brackets, pillow boxes, friction clutches and cast-iron, pressed steel and wood pulleys. In addition to the illustrations and brief descriptions, tables of the various sizes with the principal dimensions are included. Mention is also made of leather and rubber belting, Babbitt metal, vertical boilers and steam and internal combustion engines. An index with subdivisions for the various types of each product is included.

Heavy-Duty Roll Turning Lathes.—United Engineering & Foundry Company, Pittsburgh, Pa. Catalogue. Devoted to a description with illustrations of a heavy roll lathe that has just been developed. The lathes are built in 18, 26, 34, 42 and 50 in. sizes for either belt or motor drive. The features of massive construction and economy in operation are pointed out, as well as the other points of superiority. An illustrated description of this lathe appeared in *The Iron Age*, October 8, 1914.

Gears and Pinions.—Van Dorn & Dutton Company, Cleveland, Ohio. Wall hanger. Illustrates types of street cars that have been built since 1850 and calls attention to the company's line of motor gears and pinions, in the manufacture of which the company claims to have kept pace with every stage of street railway development. A message is included on gears and pinions for electric railway and mill motors and their economical operation.

Tool and Manganese Steels, Steel Castings and Tools.—Edgar Allen & Co., Ltd., Imperial Steel Works, Sheffield, England. Catalogue G-1. Illustrates the various sections of tool steel that are made, as well as a great variety of castings of manganese steel and tools with brief descriptions. Mention is made of a line of saws with views of the various types that can be furnished. The labels of the different brands are reproduced in colors.

Perforated Metals, Coal Preparing Machinery and Rivetless Chain.—Cross Engineering Company, Carbondale, Pa. Catalogue. Gives general description and specifications for a line of perforated metal, perforated sheets and plates, screens, mining machinery and a rivetless chain. Illustrations of the various types of screens that can be furnished are presented, with brief descriptions and tables of the dimensions. The line of mining machinery includes elevator buckets, troughs and flights, crusher rolls, mine buggies and cages, all of which are illustrated, with brief descriptions. A rivetless chain designed so that one or more links can be removed or added without the use of tools is illustrated. Mention is made of the attachment that can be furnished for use with the chain and the wheels over which it runs. A number of tables of useful information are included.

Power Press Safety Device.—Walsh Press & Die Company, 4707 West Kinzie street, Chicago, Ill. Circular. Illustrations and descriptive matter explain the operation of a punch press safety device requiring both the operator's hands for its manipulation. An illustrated description of this device appeared in *The Iron Age*, June 25, 1914.

Screw Plates, Taps and Dies.—F. E. Wells & Son Company, Greenfield, Mass. Catalogue No. 7-A and supplementary catalogue No. 8-A. The first mentions a line of stocks, dies, tap wrenches and screw plates in a great variety of styles and sizes, with illustrations and lists of the latter. The second illustrates a line of screw plates that are furnished in sets. Illustrations of the different combinations are given on one page, with a list of the plates in the assortment shown on the facing one.

Electrical Machinery and Appliances.—Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Descriptive leaflet No. 3742 and folder No. 4293. The first describes and illustrates a line of motor-generator sets, consisting of a direct-current generator and an alternating-current motor. The advantages of this type of machine and its characteristics are pointed out. The second shows the method of installing electrically heated glue pots and glue cookers and the advantages to be derived from their use.

Babbitt Metal.—U. S. Reduction Company, East Chicago, Ind. Pamphlet. Describes a line of Babbitt metals that are made in a number of different grades with views of the ingots in which they are cast. The special uses to which the various grades are put are briefly described under the engravings.

Water Towers.—Chicago Bridge & Iron Works, Chicago, Ill. Pamphlet. Presents views of a number of different types of water towers that have been installed throughout the country, with brief data on the capacity, hight and use that is made of them. A table of dimensions of tanks for various capacities is given, together with data on the stream that can be thrown by various pressures and the frictional loss in cast-iron pipe.

Chucks.—Cushman Chuck Company, Hartford, Conn. Catalogue. Pertains to an extensive line of independent and universal chucks, jaws and arbors. The ribs upon which the jaws of the independent chucks slide are very large and will stand the strain without undue wear or breakage. The jaws of the universal chucks, which are hardened before grinding, have curved teeth to fit the scroll thread in any position. Illustrations and brief descriptions of all the chucks are included.

Steam Specialties.—Hills-McCanna Company, 153 West Kinzie street, Chicago, Ill. Pamphlet. Lists a line of steam specialties that includes force feed lubricating pumps, high pressure gauge cocks, low water alarms and swing joints with connections for oil or grease. Practically the entire pamphlet is devoted to illustrations of the different devices, the captions of the cuts being relied upon to tell the story. Directions for connecting and working the force feed lubricating pump are included.

Cranes.—Northern Engineering Works, Detroit, Mich. Folder. Calls attention to an improved type of crane, possessing a number of safety features, the principal one of which is that the gears are inclosed in an integral part of the trolley frame. Illustrations of the crane and the trolley are presented, together with views of two installations.

Hydraulic Rams.—Rife Hydraulic Engine Mfg. Company, 111 Broadway, New York City. Catalogue. Refers to the use of a hydraulic ram for supplying water to railroad tanks, irrigation ditches, isolated buildings, etc. After an extensive description of the ram and the way in which it operates, with numerous illustrations of the various parts, its uses are taken up with diagrams showing installations that have been made.

Spacing Table.—Standard Bridge Tool Company, Bessemer Building, Pittsburgh, Pa. Collection of circulars. Concerned with an automatic spacing table for operation with punching and shearing machines of various kinds. Illustrations of the table as installed in connection with the machines are presented with brief descriptions of the character of the installation.

Chains.—Moline Malleable Iron Company, St. Charles, Ill. Pamphlet. Deals with a line of riveted chains which are divided into four classes, drive, sawdust, transfer and pintle. Illustrations, most of which are full size, are presented of the different chains in these classes, together with attachments and various sprockets and idlers. Price lists of the several chains and sprockets are included.